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ANNUAL REPORT
OF THE
GOVERNOR OF
THE PANAMA CANAL

FOR THE
FISCAL YEAR
ENDED JUNE 30
1917




386
P187

WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

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ANNUAL REPORT

OF THE

GOVERNOR OF THE PANAMA CANAL.

THE PANAMA CANAL,
OFFICE OF THE GOVERNOR,
Balboa Heights, Canal Zone, August 23, 1917.

SIR: I have the honor to submit the annual report covering the construction, operation, maintenance, and sanitation of The Panama Canal for the fiscal year ended June 30, 1917.

ORGANIZATION.

For the first six months the organization and the personnel in the principal supervisory positions remained as they existed at the close of the preceding fiscal year. On January 10, 1917, the resignation of Maj. Gen. George W. Goethals, United States Army, as Governor, was accepted by the President, and on the same date the undersigned was appointed to fill the vacancy. The position of engineer of maintenance, thus vacated, was filled by the appointment of Lieut. Col. Jay J. Morrow, Corps of Engineers, United States Army, who had been assigned to duty on the canal with that idea in view, as explained in the annual report of last year. The engineer of maintenance is next to the Governor in the canal organization, and by Executive order is designated as the official to assume the responsibilities and duties of the Governor during the latter's absence or disability.

The work of the canal on the Isthmus is divided into five principal departments, namely, operation and maintenance, supply, accounting, executive, and health. The courts are attached to the Governor's office for the purposes of administration only, as is also the district attorney, except that the latter is designated as the advisor to the Governor on legal questions. The special attorney represents the interests of the United States Government before the Joint Commission in claims arising from the taking of land for the purposes of construction, operation, maintenance, or defense of the canal. The office of the canal in Washington is charged under the Governor with the purchase of materials and supplies, the appointment in the States of employees of the canal on the Isthmus, and with such administrative matters as are more conveniently handled in Washington than on the Isthmus.

The department of operation and maintenance includes all matters relating to the actual use of the canal as a waterway, the maintenance, operation, and repair of its physical structures and auxiliaries, and all construction work incident to the completion and maintenance of the canal. The Governor assumes direct control of this department, assisted by the engineer of maintenance in all construction work and other engineering features, and by the marine superintendent in all matters relating to the navigation of the canal, including the lighthouse establishment. For the present, and until the slides in the Culebra section have been sufficiently removed to place dredging work on a purely maintenance basis, the dredging division is under the direct supervision of the Governor, with the resident engineer at its head. It will ultimately be assigned, as part of the maintenance organization, to the engineer of maintenance. The mechanical division, which operates the mechanical shops and dry docks, with a naval constructor at its head, is a branch of the department of operation and maintenance, and continues under the Governor's direct supervision.

The supply department is charged with the accumulation and distribution of materials and supplies for the canal and railroad, the operation of commissaries, hotels and messes, the recruitment and distribution of common labor, the maintenance of buildings and grounds, the assignment of quarters, and the sale of provisions and other supplies, except coal and water, to ships. It also operates corrals and vehicular transportation.

The accounting department is responsible for the correct recording of financial transactions of the canal and railroad, the administrative auditing of vouchers covering the receipt and disbursement of funds preliminary to the final audit by the Auditor for the War Department, cost keeping of the canal and railroad, the checking of timekeeping, the preparation of estimates for appropriations and the allotment of appropriations to the various departments and divisions, and the examination of claims arising under the injury compensation act. The collector and paymaster are attached to the accounting department.

The executive department, administered by the Governor through the executive secretary, includes the division of civil affairs, subdivided into the bureau of customs, the administration of estates, and the postal service; the police and fire division; the division of schools, and the bureau of clubs and playgrounds. The executive secretary has general supervision of the clerical forces of the canal, except that of the accounting department, and is responsible for the organizations that keep the general records of the canal and railroad, including all correspondence and matters relating to personnel, property accountability, the compiling of statistics, and the keeping of time of all employees of the canal and railroad. He acts as the

Governor's representative in matters affecting the relations between the Canal Zone Government and the Republic of Panama, and in such matters he communicates officially with the secretary of foreign affairs of the Republic.

The department of health is charged with all sanitary matters within the Canal Zone and the cities of Panama and Colon; the operation of the hospitals and dispensaries, the enforcement of quarantine regulations, and the compilation of vital statistics in the Canal Zone and in the cities of Panama and Colon.

Other than the engineer of maintenance, the heads of departments and divisions reporting to the Governor during the year were as follows:

Marine division, Commander H. I. Cone, United States Navy, marine superintendent.

Dredging division, Mr. W. G. Comber, resident engineer.

Building division, Mr. George M. Wells, resident engineer, to the date of his resignation, February 2, 1917, when the work of the building division was placed under the supervision of the engineer of maintenance, with Mr. Hartley Rowe as resident engineer.

Mechanical division, Naval Constructor D. C. Nutting, United States Navy, superintendent, until his relief from duty with the canal on December 15, 1916, when he was succeeded by Naval Constructor R. D. Gatewood, United States Navy.

Supply department, Maj. William R. Grove, Quartermaster Department, United States Army, chief quartermaster.

Accounting department, Mr. H. A. A. Smith, auditor; Mr. T. L. Clear, collector; and Mr. J. H. McLean, paymaster.

Executive department, Mr. C. A. McIlvaine, executive secretary.

Health department, Lieut. Col. D. C. Howard, Medical Corps, United States Army, chief health officer.

The Washington office of the canal was in the charge of Maj. Earl I. Brown, Corps of Engineers, United States Army, as chief of office and general purchasing officer.

Mr. Charles R. Williams continued as district attorney throughout the year.

Judge Frank Feuille, as special attorney, represented the Government before the Land Commission and advised the Governor in several matters of administration. He was also counsel of the Panama Railroad.

Plate No. 1, showing the organization of The Panama Canal June 30, 1917, accompanies this report.

OPERATION AND MAINTENANCE.

At the close of the preceding fiscal year the principal construction work remaining uncompleted included the coaling plants at Cristobal and Balboa; the commercial Pier, No. 7, at Cristobal, con-

structed from funds of the Panama Railroad; Pier No. 6 at Cristobal, which was authorized by Congress and for which appropriation had been made in part; the east breakwater at the Atlantic entrance of the canal; and various buildings and quarters for the canal and for the Army stationed on the Canal Zone for the defense of the canal. At the Balboa dry dock there remained some minor items of work, including the finishing of the floor and the blocking system, the delivery and installation of a locomotive crane, the grading and paving of the area around the dock, installation of capstans and bollards, and general cleaning-up work. There remained also a small amount of dredging work in the canal prism, which, in a few places, had never been excavated to full width and depth.

TERMINAL CONSTRUCTION.

The dry dock, coaling plants, harbor structures, and the breakwater had been in the charge of Admiral H. H. Rousseau, United States Navy, as engineer of terminal construction, and, with the exception of Pier No. 6 at Cristobal, were almost entirely completed under his supervision. Upon his relief from duty with the canal in July, 1916, the work in progress was transferred to the engineer of maintenance, under whose direction it remained throughout the year, or until completed.

The dry dock at Balboa (fully described in former reports) was completed and transferred to the mechanical division for service on May 15, 1916. A statement of the operation of the dry dock will be found in the report of the superintendent of the mechanical division, Appendix D.

The Cristobal coaling plant was placed in service on September 20, 1916, its operation being assigned to the Panama Railroad under Mr. T. W. McFarlane, superintendent of the plant. The Balboa coaling plant was completed on December 1, 1916, but, due to the necessity for dredging alongside the unloading and reloading berths, and delay in the delivery of digging buckets, tests of the plant preliminary to final acceptance were not completed until after the close of the fiscal year. Detailed descriptions and cost of construction of the coaling plants were contained in the report for 1916.

Except for certain defects in the design and construction of the unloader towers and machinery, affecting the continuous operation at or near capacity, which defects are being remedied by the contractors under guarantee bond, the plants have been entirely satisfactory.

At the Cristobal plant 474,378 tons of coal were received from September 20, 1916, the date of taking over the plant for operation, to July 31, 1917, inclusive. During the same period 449,531 tons were

delivered from the plant, of which 343,423 tons were sold to ships. The best single performance of the reloaders of the Cristobal plant was on December 16, 1916, when the steamship *Cumberland* took 510 tons of bunker coal in 31 minutes. The unloading towers on December 30 and 31, 1916, discharged into the storage pile 12,000 tons of coal from the collier *Achilles* in 21½ hours actual working time. On July 2 and 3, 1917, they discharged from the collier *Ulysses* 12,000 tons in 21 hours actual working time. The average cost of operation of the plant per ton of coal delivered to a ship at the reloader wharf is \$0.90. This figure includes operations of both the unloader and the reloader towers, and the machinery for delivery into storage and removal therefrom.

At the beginning of the fiscal year the substructure of Pier No. 7 at Cristobal had been completed, and the floor was complete except for the laying of paving brick, which was 20 per cent complete. There remained to be erected 5 per cent of the structural-steel shed and 80 per cent of the concrete work in the walls and columns. The pier was completed on November 1, 1916, and was immediately put into service. Pier No. 7 was constructed from funds of the Panama Railroad.

The sundry civil act of July 1, 1916, authorized the construction of an additional pier, numbered 6, at Cristobal, at a limit of cost of \$1,500,000, and made an initial appropriation of \$800,000 for the beginning of the work. This pier is to be of the same general dimensions as Pier No. 7 and of the same type of construction. Due to the increased depth to rock at the site of Pier No. 6, the total length of cylinders in the foundation will be 12 per cent greater than in Pier No. 7. After some preliminary dredging work in the removal of 243,198 cubic yards of silt from the site of the pier, construction of the trestle and false work for the driving of steel cylinders was begun in October and completed in February. One thousand one hundred and thirty-five linear feet of trestle and false work were driven, at a unit cost of \$36.23 per linear foot. The necessary power and motor lines and construction tracks laid on the trestle increased this cost to \$41.84 per linear foot. The steel for the cylinders was furnished under contract with the Riter-Conley Company, of Pittsburg, Pa., at a unit price of \$0.0357 per pound, the material to be cut to dimensions and delivered flat. Deliveries began in December, 1916, and were completed in April, 1917. The rolling and assembling of material into cylindrical shape was performed by the mechanical division at Cristobal shops at a unit cost of \$4.206 per linear foot of cylinder. Driving of the cylinders was begun on November 29, 1916, and at the end of the fiscal year was 65 per cent complete, with a total of 15,855 linear feet of cylinders in place. The removal of ma-

terials from the interior of the driven cylinders was begun December 15th, and was 63 per cent complete on June 30, 1917, 10,503 cubic yards of material having been removed. The filling of the cylinders with concrete was begun on January 25, 1917, and at the close of the fiscal year 10,987 cubic yards of concrete had been placed. In order to avoid the difficulties experienced in the construction of Pier No. 7 and of the Cristobal coaling plant, due to the collapse of the steel cylinders on account of the heavy external pressures at extreme depths, the thickness of the steel sheets used in the sections at and below depths of 70 feet was prescribed at one-half inch, instead of three-eighths inch. No trouble with collapsing cylinders has been experienced in Pier No. 6. Economy was effected by Mr. T. B. Monniche, the engineer in charge of the design and construction of the pier, by using three derrick barges, available from the breakwater work, in setting, driving, excavating and concreting the cylinders. This floating equipment made it possible for one longitudinal trestle to suffice instead of four, as were necessary on Pier No. 7. Plans and specifications for the structural steel work on the floor system were prepared during the first half of the fiscal year. Bids were advertised for during January and February and were opened on February 12, 1917. The lowest price offered was \$0.052 per pound, an increase of more than 150 per cent over the corresponding costs of the steel in Pier No. 7, amounting to an increase of \$365,000 in the cost of floor construction. These facts led to a change in design of the floor system, using reinforced concrete instead of structural steel, with an estimated saving of \$253,000, but with a remaining increase of \$112,000 over the cost of the floor system of Pier No. 7.

Improvements were made in the layout of the roads in the approaches to the docks at Cristobal, increasing the facilities for handling the traffic to and from the docks. An iron fence was erected, preventing access to the system of docks from the shore except through gates, in order to protect the cargoes stored on the docks against loss by theft and to prevent smuggling of goods into Panaman territory.

To afford protection to Pier No. 6, both during and after construction, against the high seas which, in stormy weather, pass through the interval between the two breakwaters, it was necessary to extend the Cristobal mole a length of about 810 feet. Work on the trestle for this extension was begun on June 10, 1916, and was continued intermittently, keeping pace with the fill, until completed in February, 1917. The fill, containing 119,414 cubic yards of soft rock excavated from the borrow pit at Mount Hope, was begun in August, 1916, and completed in February, 1917. For the protection of the sea slope of the mole extension 26,038 cubic yards of hard rock from Sosa

Hill were placed as armor. The mole serves the double purpose of a breakwater and of a fill on which to lay the railroad approach and yard tracks for the service of the pier.

A boat landing and launch house for the use of small boats in service at the Atlantic entrance was authorized to be constructed at the head of the slip between Piers Nos. 7 and 8. The substructure was completed on May 27, 1917, when work was suspended, due to delay in receipt of steel for the floor of the landing.

At the east breakwater there were placed by derrick barges from July to October, inclusive, 10,055 (81,156 cubic yards) concrete blocks as armor, and the harbor slope was completed by depositing from scows 46,350 cubic yards of material excavated by a ladder dredge working at the Cristobal coaling station. The breakwater was completed on November 30, including the removal of the tracks from the trestle and the salvaging of the trestle timbers. To provide for repairs to the breakwaters that may be made necessary from the action of storms, 1,143 concrete blocks, containing a total of 10,237 cubic yards, were manufactured and placed in storage at the Coco Solo yard. In August, September, and October, 1916, 612 concrete blocks, containing 9,667 cubic yards, were placed on the west breakwater to complete repairs due to damage done by the "northers" of 1915.

The total cost of the east breakwater up to the end of the preceding fiscal year was \$3,365,743.56. The charges for work done during 1917 make the total cost of the completed breakwater \$3,797,560.65. For further details of the terminal construction work, see report of the engineer of maintenance, Appendix A.

BUILDING DIVISION.

The operations of this division cover the construction of all buildings for the canal and railroad, barracks and quarters for the Army, and repairs of canal and railroad buildings in cases where the estimated cost of repairs undertaken in any instance exceeds \$50. During the year work was in progress on the construction of 307 buildings for the canal, 3 for the railroad, and 64 for the Army. The principal buildings for the canal were the administration building, dispensary, laboratory, and an additional ward in the new Ancon Hospital group; 3 new concrete restaurants at Cristobal, Balboa, and Ancon; 5 new concrete school buildings at Cristobal, Gatun, Pedro Miguel, Ancon, and Balboa; separate storehouses of concrete for electrical supplies, paint, lumber, and general supplies; the concrete grand stand at the baseball and athletic grounds at Balboa; 4 concrete 4-family quarters at Balboa; 174 family quarters of timber con-

struction at Ancon-Balboa; 44 family quarters of timber construction at Pedro Miguel; and 32 12-family sets of quarters of timber construction for silver employees. For the Panama Railroad there were constructed a concrete freight and baggage building at the Cristobal docks, and an electric-charging station at Balboa. The buildings for the Army included additional barracks and quarters at Fort Grant, Fort Sherman, Fort Randolph; artillery headquarters and barracks and band quarters at Fort De Lesseps; and barracks, quarters, shops, and special buildings for the Ordnance Department at the Ordnance Depot at Corozal, all provided for in appropriations by Congress and allotted to the Governor of The Panama Canal for expenditure. Details accompanying the report of the building division, Appendix A, show the types, the dates of beginning the work, the dates of completion, and the cost to June 8, 1917, of all the buildings in course of construction during the year.

The five school buildings are all of similar construction. They have exterior walls and, in most instances, interior walls of reinforced concrete, the remaining walls being of hollow concrete blocks, cement plastered; and reinforced concrete floor slabs and stairs throughout. The finished floors of classrooms, teachers' rooms, libraries, offices, and assembly rooms are of select narrow yellow pine, on wood sleepers buried in concrete; finished floors in entrance halls, interior corridors, and libraries are 6-inch square vitreous red tile; stairs have patented safety treads and reinforced-concrete newels and hand rails and wrought-iron square balusters; roofs are red tile, supported on wood frame; the general classrooms in all five schools are 21 feet by 32 feet 6 inches, accommodating 40 pupils, and each room is lighted by windows so placed as to admit light over the pupil's left shoulder while at his desk. All the schools are fully equipped with modern toilet fixtures, and each classroom with bookcase and slate blackboards.

The Ancon Hospital dispensary, laboratory, and ward group, completed during the year, were described in detail in the report for last year. The administration building, the construction of which was begun on March 20, 1917, was 25 per cent completed at the end of the year. This building, the central unit of the entire hospital plant, occupies a commanding position in the group overlooking Panama City and the bay. It is three stories and a basement in height, in plan the shape of the letter U, 154 feet 2 inches by 110 feet 3 inches over all dimensions, and comprises the various clinics, administrative offices and operating suites. Space in the basement has been provided for the drug dispensary, drug manufacturing department, store rooms, and a linen sorting room, with a laundry chute connecting it with the other floors of the building. On the first floor accommodations are provided for the eye and ear and medical clinics, X-ray

department, and waiting rooms for the public. On the second floor will be located the offices for the superintendent and clerks, doctors' bedrooms for the officers of the day, library, and file room. The entire third floor is devoted to the operating suite and surgical clinic. The building will be constructed of reinforced-concrete bearing walls and reinforced-concrete floor slabs, with Spanish red-tile roof supported by a wooden frame of yellow-pine timbers.

The kitchen and mess for the hospital plant is directly in rear of the administration building, and is centrally located with reference to the different wardrooms. It will be constructed of reinforced concrete beams and columns, with reinforced concrete floor slabs, and cement block exterior curtain walls and interior partitions. The roof will be of Spanish red tile on timber supports, uniform with the other buildings of the hospital group. The main kitchen, storeroom and refrigerator room, diet kitchen, steward's office, and dining room for the kitchen help and silver convalescent patients have been provided on the first floor. To facilitate the handling of food to bed patients in the various wards and private rooms an elevator with a capacity of six food carts will be installed to run between the kitchen and basement floor to the level of the covered passageways which lead to the various buildings of the hospital group. Two large dining rooms are provided, one for the doctors and nurses and the other for the gold male convalescent patients, on the second floor. Further details of these buildings are contained in the report of the building division, Appendix A.

The restaurants constructed at Cristobal, Balboa, and Ancon are the first of a permanent type that have been built on the Canal Zone, and are an improvement in design, appearance, and convenience over the so-called "line hotels" of the construction period. For reasons of cleanliness, the kitchens, dining rooms, and refrigerating rooms have white vitreous enamel tile bases. The inside faces of the walls are painted white enamel, the food counters are marble, the steam tables Monel metal. The buildings all have reinforced concrete bearing walls, columns and floor systems and partitions, and nonbearing walls of concrete block. Steel trusses and purlins support the wood rafters and red tile roofs. They are one-story structures with square columns spaced 8 feet 10 inches in the clear, with copper screening between, taking the place of outside walls, thus providing an open pavillion effect for the dining room and such parts of the kitchen and other service rooms that are not necessarily inclosed with solid walls. Protection from the sun and rain is provided for the open spaces by an extra projection of the roof eaves.

In addition to the work above referred to, the building division has constructed a number of small buildings on work requests from other divisions in the canal and Panama Railroad, and temporary struc-

tures for troops in the vicinity of the various canal structures which they are guarding. Additions and alterations were made to buildings 6, 7, and 9, Balboa shops, alterations to Balboa and Cristobal mess houses, and Young Mens' Christian Association buildings were constructed at Paraiso and Cristobal. Details showing the total and unit cost of the buildings completed during the year are contained in the report of the building division, Appendix A.

LOCKS OPERATION.

At Gatun there were 1,741 commercial and 160 noncommercial lockages, and 1,909 commercial vessels were passed through during the year; at Pedro Miguel there were 1,797 commercial, 271 noncommercial lockages, and 1,938 commercial vessels were passed; at Miraflores there were 1,792 commercial, 233 noncommercial lockages, and 1,930 commercial vessels were passed. The ships passed exceeded the number of lockages because it is the practice to lock two ships through simultaneously when they arrive at the locks within a short time interval and their combined length does not exceed 720 feet. There were no delays due to machinery failures in any of the lock operations and there were no cases of serious damage to ships while in the locks. The most frequent minor damage is the breaking of the ships' chocks, due in almost every instance to their defective construction and insufficient strength to take the strain of the tow line.

The maintenance work at the locks has consisted in the systematic inspection and overhauling of all the operating machinery and towing machines, minor changes in small details as improvements were developed by use, painting of gates and other exposed steel surfaces, repairs to the floating caisson, the renewal of timber fenders on the wing and approach wall, and the application of bitumastic solution and enamel to the valves and submerged portions of the lock gates. At Gatun experimental use was made of a patented machine for applying a protective coating of zinc on steel and other metallic submerged surfaces, with the idea of preventing the voltaic action that causes corrosion. One of the rising stem valves, with the roller train rods, guide bearings, the valve stem, and all bolt heads and nuts were thoroughly cleaned and sand blasted, and a coating of zinc applied. A section of the downstream side of one of the gates below sea level was similarly treated. Since the work was done the lock has not been unwatered, and no information is as yet available as to the success of the experiment. The expedient of using greenheart lumber to replace the babbitt metal valve seats and lignum-vitæ side seals in place of machinery steel at Miraflores, as described in last year's report, has been only partially successful in checking the corrosive action experienced. The bitumastic enamel was successful

as a protective coating for the valve surfaces, so far as can be judged during the short time that has elapsed since it was applied. Maintenance work has been done by the Bitumastic Enamels Company under their guaranty to maintain the coating applied by them to the lock gates at Gatun and Miraflores. At Gatun the surface so retouched on the gates of the upper and middle chambers has amounted to about one-third of the original surface covered. This work was evidently made necessary by the failure of the material to adhere to the steel surface of the gates, and this was probably due to lack of care in cleaning and drying the surfaces before applying the bitumastic. Where the bitumastic has adhered to the steel it has afforded satisfactory protection both against rust and on account of the insulating property of the material against corrosion due to voltaic action. At Pedro Miguel bitumastic solution and enamel purchased from the Navy Department has been applied to the gates by the lock forces. The cost of the work, including the materials, was much less than the contractor's price, but the maintenance of the protective coating for five years will have to be considered before an actual comparison of costs can be made.

The unwatering of lock chambers for purposes of inspection, painting and repairs of valves, and the painting of gates has caused one side or the other of the double locks to be closed to traffic for periods, as follows: Gatun, 188 days; Pedro Miguel, 119 days; and Miraflores, 124 days. A few items of construction work were completed at the locks; among them is a dock landing for small boats at the northeast wing wall of the Gatun locks; mess buildings for gold and silver employees, repair pits for towing locomotives, and grading of backfills at the Pacific locks.

The work at the Gatun spillway consisted entirely of painting the spillway gates and bridge and the usual upkeep of the operating machinery. The installation of heavy steel plates on the baffle piers to prevent erosion was delayed, due to nonarrival of material, until too late to complete the work during the dry season. This work must of necessity be done in the dry season on account of the frequent opening of the spillway gates during the rainy season. At the Gatun dam a fill was made along the crest for a length of 550 feet west of the locks, in order to restore the section to full height. Earth excavated at the site of the addition to the hydroelectric station at the spillway was used in making the fill; the amount placed was 15,000 cubic yards.

ELECTRICAL DIVISION.

This division remained in the charge of Maj. William H. Rose, United States Army, until his relief from duty with the canal on June 1, 1917, when Maj. T. H. Dillon, United States Army, was ap-

pointed to succeed him. The hydroelectric generating station at Gatun, the reserve steam-driven electric-generating plant at Miraflores, the substations, transmission lines, and power-distributing systems throughout the canal were all satisfactorily maintained and operated. This division also continued to install, maintain, and operate the municipal and house lighting systems, the telephones and telegraphs, fire alarm, and the railway block signals and interlocking plants. The average monthly consumption of electricity generated for all purposes was 3,645,325 K. W. H., at a cost, including depreciation, of \$0.0073 per K. W. H. consumed for power purposes, and \$0.0134 for lighting purposes, the latter figure including maintenance of interior house wiring and lamp renewals.

The new water wheels, referred to in last year's report, were installed at the Gatun spillway, resulting in an increased capacity from 6,000 K. W. to 8,640 K. W., at 80 per cent power factor. This work was completed December 19, 1916, at a cost of \$16,377.91. Funds were provided for the installation of an additional unit and the extension of the station building to accommodate this unit and provide space for the future installation of two more units. This work was begun on January 1, 1917, and at the end of the year the concrete draft tubes and the foundations of the building extension were completed and the erection of penstocks 10 per cent completed. A contract was made on November 22, 1916, for the construction of the new generator unit, to be delivered on December 2, 1917. This generator will be a General Electric 66,000-volt, 3-phase, 25-cycle, 4,500 K. W., at 80 per cent power factor, mounted on a vertical shaft direct connected to a 6,750 H. P. turbine furnished by the Pelton Waterwheel Company. With the changes heretofore made in the three water wheels originally installed, this additional unit will increase the capacity of the Gatun station to 13,140 K. W., and the ultimate capacity provided for when the two additional units are installed will be 22,140 K. W. This will take care of about twice the present load and will make available a reserve of about 50 per cent above any increases in load now in contemplation.

The work of installing in the Miraflores station the units from the dismantled steam-power plant at Gatun was completed on December 14, 1916. This installation increased the capacity of the Miraflores station to 7,200 K. W. The steady growth of the electric load on the canal has made necessary the intermittent operation of the Miraflores plant to carry the peak loads pending the increase in capacity of the Gatun hydroelectric station. As a reserve the Miraflores plant provides power for the Pacific locks and the lighting and power systems at the Pacific terminus of the canal at times of breakdown in the transmission lines or other interruptions of power from the Gatun plant. The principal additional loads carried during

1917 were: Balboa coaling plant, 1,267 K. W.; Balboa dry dock, 6,040 K. W.; air-compressor plant at Balboa, 1,600 K. W.; cold storage and ice plant, Balboa, 450 K. W.; and additional lights requiring 1,300 K. W. in the various municipal buildings, schools, and Army and canal quarters. To provide an adequate reserve at the Miraflores plant it will be necessary to increase its capacity so as to maintain it at about two-thirds the capacity of the Gatun plant.

The necessity for increased electrical output has led to a consideration of the water consumption from Gatun Lake by the Gatun hydroelectric station and its effect on the level of Gatun Lake during the four months' dry season. The dry season of 1917 was abnormal in length and in deficiency of rainfall, and as the traffic through the canal was above the average and the consumption at the hydroelectric station increased, an opportunity was afforded to observe the fall in lake level under conditions of large consumption and small inflow of water. The results are discussed in the part of this report relating to meteorology and hydrography. It may be stated here, however, that it will be necessary, with a pronounced increase in canal traffic, to operate the hydroelectric station at less than its ultimate capacity during dry seasons and to supply the deficiency in electric power by the operation of the Miraflores plant during the corresponding periods.

There was a large increase in telephone service during the year. On June 30, 1916, 1,878 telephones were in use, and on June 30, 1917, 2,154. The average number of telephone calls per day was 21,042. To care for the increase in telephone business plans are developing for a new exchange at Cristobal and the installation of additional cable for trans-isthmian service.

The construction work of the division included the laying of 185,000 feet of underground cable and the installation of lighting systems in 86 Army buildings, 45 Panama Railroad buildings, and 991 apartments for canal employees.

For further details attention is invited to Appendix A.

MUNICIPAL ENGINEERING DIVISION.

This division continued under the immediate charge of Mr. D. E. Wright, as municipal engineer, reporting to the engineer of maintenance. The work of the division consisted of the maintenance and repair of municipal improvements in the Canal Zone and in the cities of Panama and Colon, the care and maintenance of the water reservoirs, and the maintenance and operation of the pumping stations and water filtration plants. In addition to the maintenance work the division performed all road and municipal construction work for all new town sites for the canal, and similar work in the Army posts,

Fort Grant, Fort Sherman, Fort Randolph, and Fort De Lesseps. The reservoirs and pumping plant on the west side of the canal, for the service of the military posts at Las Cascadas, Empire, and Culebra, were maintained and operated. At the Mount Hope pumping station the average number of gallons pumped a month was 119,169,500; at Agua Clara, 27,084,750; at Gamboa, 284,661,833; at Miraflores, 30,162,500; at Balboa, 205,171,250; and at Paraiso, 6,220,166. The average division cost for water delivered in the various districts per 1,000 gallons during the year was as follows: Cristobal, \$0.06; Gatun, \$0.11; Gamboa, \$0.34; Paraiso, \$0.07; Pedro Miguel, \$0.07; Miraflores, \$0.06; and Balboa-Ancon, \$0.06. These figures include the costs of filtration and purification at the filtration plants at Mount Hope and at Miraflores. At Cristobal 47,257,000 gallons and at Balboa 14,558,000 gallons were sold to ships during the year.

The municipal maintenance work performed in the cities of Panama and Colon, at a total cost of \$152,289.89, was repaid to the municipal division from water rentals, in accordance with the terms of our agreement with Panama. In the city of Panama the average daily consumption of water for the year was 2,398,250 gallons, and in Colon 1,626,695 gallons.

The principal items of construction by the municipal division for The Panama Canal consisted of the grading of grounds and the installation of water and sewer lines, streets, and sidewalks in the new addition to the town at Balboa, making fill and grading grounds and constructing water and sewer systems, streets, and sidewalks in the new town of Cristobal, and the construction of connecting roads in outlying districts. For those purposes the expenditures were \$488,948.81. For the Army, \$530,912.70 were expended in grading, installing water and sewer systems, and constructing streets and sidewalks at Fort Grant, Fort Sherman, and Fort Randolph, the construction of a concrete road from Fort Randolph to Mount Hope, from Fort Grant to Balboa, and the construction of roads, streets, water and sewer lines for the new Ordnance Depot at Corozal, and repairs to roads and streets in the camps at Culebra, Empire, Las Cascadas, and Quarry Heights. For the Panama Railroad there were constructed the G Street storm sewer in Colon, the railroad's share of the Curundu River storm sewer, the roads at the Cristobal piers, water lines for cattle pastures, roads to a number of the plantations, and improvements to pavements in the vicinity of the passenger station of Panama City. The cost of the work performed at the expense of the railroad was \$126,849.40. Work done for outsiders, for which deposits were made to cover the cost, included the making of private water taps, the construction of short sections of road, and repairs to the tramway company's right of way in Panama City and to the streets in Panama and Colon that were opened up for the

installation of the gas company's mains. Work was done at the Balboa terminals, consisting mainly of the rat proofing of Piers Nos. 15 and 16, construction of retaining walls for Pier No. 18, riprapping and grouting of banks in rear of Docks Nos. 17 and 19, the extension of oil lines for the delivery of oil at the coal-handling plant, the extension of water lines on the piers, and the grading and asphaltting of areas at the Balboa shops. This work was performed at a cost of \$88,662, chargeable to the appropriations for the terminal work.

During the year the division constructed a total of 155,137 square yards of concrete streets and roads, at a cost of \$1.73 to \$2.40 per square yard; 59,916 square yards of asphaltic streets and roads, with macadam and Telford foundations, at a cost of \$2.03 per square yard; and 12,046 square yards of macadam roads, with Tarvia binder, at a cost of \$1.52 per square yard. Experience with water-bound macadam roads has proved that the prevalence of heavy rains during the rainy season and the lack of water in the dry season increases the maintenance of this type of road so as to make its further construction undesirable. The records show that the cost of maintenance for nine years of water-bound macadam roads, added to the original cost of construction, amounts to twice the cost of construction of a concrete road.

The further investigations of the physiologist, Mr. George C. Bunker, in charge of the operation of the water filtration plants, have developed additional data with reference to the treatment of tropical waters for drinking purposes. The report for last year included an elaborate statement by Mr. Bunker on the subject. His further investigations have resulted in scientific facts of technical interest and importance, which it is hoped to publish in separate form.

For further details of the operations of the municipal engineering division, see report of the municipal engineer, Appendix A.

METEOROLOGY AND HYDROGRAPHY.

This division continued in the charge of Mr. F. D. Willson, chief hydrographer. All of the meteorological and hydrographic observation stations enumerated in last year's report were maintained and operated. An automatic wind-velocity instrument was installed at the signal station on Sosa Hill and an anemometer and rain gauge at Cape Mala, at which point a lighthouse was established in the fiscal year 1916. The meteorological office at Colon was moved from the old Panama Railroad offices to the new Atlantic terminal building; records were begun at the new location on March 1, 1917. The temporary water gauge registers at Juan Mina, Vigia, Frijoles, and Trinidad were replaced by permanent structures of steel and con-

crete during the dry season of 1917. Arrangements were made with the United States Weather Bureau at Washington to furnish meteorological reports at 8 a. m. and 8 p. m. daily between June 1 and December 1. Weather forecasts are received daily for the Caribbean Sea, Gulf of Mexico, and South Atlantic Ocean, and special hurricane reports are received during the hurricane season. This information is supplied all shipping using the canal. Ships are also given the opportunity to compare their barometers and chronometers with standard instruments maintained by the canal. Standard time is obtained daily by wireless from Washington.

Meteorological statistics are collected by calendar years to comply with the general custom. For the calendar year 1916 the rainfall was above normal over the Pacific half of the Canal Zone, and below normal over the Atlantic half. The average precipitation over the Pacific section was 83.6 inches, 96.01 inches over the Central section, and 105.29 inches over the Atlantic section. The dry season rainfall for 1916 was 11 per cent of the total for the year in the Pacific section, 10 per cent in the Central section, and 12 per cent in the Atlantic section. March was the driest month and October and November the months of heaviest rainfall. The maximum rainfall during 24 hours was 8.17 inches at Brazos Brook on November 16 and 17. For the first six months of the calendar year of 1917 the rainfall was below normal throughout the Canal Zone.

The average air temperature for 1916 was 1° F. above normal on the Atlantic coast, and 1° F. below normal on the Pacific coast. At Balboa Heights the maximum recorded temperature for the year was 92° F. on April 5, and the minimum was 62° F. on February 5. At Colon the maximum was 90° F. on May 11, and the minimum 72° F. on May 27. The lowest temperature of record was 58° F., at Alhajuela on March 25, 1917. The previous low-temperature record was 59° F. at Bas Obispo on February 9, 1907.

The wind movements over the Canal Zone for 1916 were below the average. The maximum wind velocity recorded on the Isthmus remains at 59 miles per hour, at Balboa Heights on July 10, 1909. At Colon the maximum is 46 miles per hour, recorded on April 14, 1915.

There were no fogs on either coast during 1916, but numerous fogs were reported at interior stations. As usual, the fogs were lifted by 8.30 a. m.

Thirty-two seismic tremors were recorded at the Balboa Heights station during the fiscal year ended June 30, 1917. Twenty-five had their origin at distances of from 70 to 760 miles, and the remainder were of distant origin, ranging from 1,045 to 4,950 miles. The intensities varied from I to IV on the Rossi-Forel scale of I to X.

No damage resulted to any of the canal structures from any of these shocks.

The yield of the Gatun Lake watershed for the dry season of 1917 (January to April, inclusive) was 38 per cent below the seven years' dry-season average. The yield was 1,348 cubic feet per second, while the average is 2,076 cubic feet per second. The dry season of 1912, during which the yield was 892 cubic feet per second, is the only one since the lake was formed that gave a smaller yield. The run-off of the Chagres River above Alhajuela, which is the principal source of water, was 49 per cent below the average of dry seasons for a period of 16 years. During the dry season of 1917 the maximum lake elevation was at 86.70 on January 2, and the minimum 83.14 on April 27, the fall being equivalent to a loss of 16.14 billion cubic feet. The consumption of water from the various causes during the dry season of 1917 was as follows, in units of a million cubic feet:

Gatun spillway gate operations.....	93.94
Gatun spillway leakage.....	44.79
Gatun locks operation.....	2,757.63
Gatun locks leakage.....	61.48
Gatun hydroelectric plant.....	12,910.57
Pedro Miguel lock operation.....	2,210.29
Pedro Miguel lock leakage.....	51.74
Maintaining Miraflores Lake through Pedro Miguel lock.....	317.79
Pumping at Gaillard Cut.....	13.24
Brazos Brook Reservoir.....	97.93
Pumping at Gamboa.....	146.05
Evaporation.....	9,988.01

It thus appears that the principal consumption of water from the lake was at the hydroelectric plant at Gatun. If this station had not been in service Gatun Lake would have passed through the dry season with a loss of level of 0.7 of a foot, while supplying water for all of the through lockages made, which averaged 166 per month during the dry season. The enlarged hydroelectric station, when developed to its ultimate capacity, will consume about 150 per cent more water than the existing station, or about 7,700 million cubic feet per month as against the present monthly average of 3,080 million cubic feet.

Between elevations +87.00, the adopted maximum height of the lake at the beginning of the dry season, and +80.00, the minimum height which will give a depth of 40 feet throughout the canal, there is a storage capacity of 31,890 million cubic feet of water. Assuming the inflow and all losses except those for lockages and power the same as during the last dry season, the lake would have provided sufficient water for an average of 40 through lockages a day, provided no water had been consumed for the generation of power. If the enlarged hydroelectric station had been constantly operated at full

capacity during the dry season, the lake would have provided sufficient water for about 156 lockages per month without drawing the lake below the +80.00 level. This is slightly below the present traffic.

There is no doubt of the ability of the lake during the wet season to provide an abundance of water for operating the power plant to its ultimate capacity, and, at the same time, an increased use of water for lockage purposes up to the capacity of the canal. It will always be possible, therefore, at the end of the wet season, to leave the lake at its maximum height of +87.00. During dry seasons, depending upon their intensity and length, the hydroelectric plant may be operated at partial capacity only, the deficiency in power for the time being to be supplied by the operation of the auxiliary steam generating plant at Miraflores. So far as may now be judged, the use of the Miraflores steam plant as a reserve during dry seasons is more economical than would be the creation of additional water power at Alhajuela, and in any event the Miraflores plant must be maintained at all times as an emergency reserve.

An average of 36 lockages per day is about the practicable capacity of the canal, as maintenance and repair of operating machinery will necessitate the occasional closing of one flight at each of the locks. As it is to be presumed that in making 36 lockages a day many opportunities will arise for passing two ships simultaneously in a lockage, the capacity for passing ships will be correspondingly greater.

For further details attention is invited to Appendix A.

SURVEYS.

The general surveying work remained under the direction of Mr. O. E. Malsbury, assistant engineer. During the year corner and grade stakes were set in Colon for 181 building lots, and 19 block monuments were set. The restricted area line, governing the location of cantinas in Panaman territory 25 meters from the Zone line, was surveyed and established by 16 monuments. Lots were surveyed and staked in Cristobal for the United Fruit Company and for the French Steamship Company. At Balboa a lot was staked out for the International Petroleum Company, and in Panama Yard lot No. 30 was surveyed and staked out for the Panama Railroad Company. Monthly observations were continued of the settlement hubs on Gatun dam, showing normal settlement throughout the year. Grade stakes were set out for the fill made on the east valley, south toe, of Gatun dam. Twenty-two precise level bench marks were cleared and repaired, and two were transferred on account of construction work. The stations established on Gold, Zion, and Contractors Hills, at the request of the Slide Commission, were read periodically during the year, showing no movement. Ten trian-

gulation stations were established along the Panama Railroad, and 17 other stations were also established. Sixty-seven Zone triangulation stations were cleared and repaired, and trochas opened up to permit visibility. Surveys were made and maps prepared, showing boundary lines, areas and improvements on various estates for which claims were pending before the Joint Land Commission. Numerous surveys were made for the supply department in connection with the pastures and plantations operated by that department. The survey of the Panama-Ancon-Balboa district, which has for its scope the location of all improved public and private buildings and Panama Railroad property lines in the city of Panama, the location of buildings, streets, manholes, fire hydrants, water lines, and railroad tracks within the limits of the towns of Ancon and Balboa was about 75 per cent completed. The finished map will be in two sections, on a scale of 1-2000.

A survey was made of the new boundary line of the Colon Radio Naval Reserve and of the quarantine reservations at Colon. Numerous minor surveys, observations, and calculations were made for the various departments and divisions of the canal.

For further details attention is invited to Appendix A.

OFFICE ENGINEER.

This office continued in the charge of Mr. C. J. Embree, who has charge of the drafting forces under the engineer of maintenance, and has handled miscellaneous drafting and designing work as required from time to time by other departments and divisions of the canal.

For further details concerning the work done under the engineer of maintenance, attention is invited to Appendix A.

MARINE DIVISION.

The traffic through the canal showed an increase over that of previous years. A total of 1,876 vessels of all classes passed through the canal from July 1, 1916, to June 30, 1917, inclusive. Of these, 905 passed from the Atlantic to the Pacific, and 971 from the Pacific to the Atlantic. In the fiscal year 1915, 1,088 vessels passed through the canal, and in 1916, 787. The total number of vessels transiting the canal since it opened for commercial traffic in August, 1914, is 3,751. The total net tonnage, canal measurement, for the several years is as follows: 1915, 3,849,035; 1916, 2,479,762; and 1917, 6,009,358. The cargo tonnage transported was, for 1915, 4,969,792; 1916, 3,140,046; and 1917, 7,229,255. Details showing further totals of traffic are contained in the report of the marine superintendent, Appendix B.

The traffic for the year yielded a revenue of \$5,631,781.66 from tolls. The rules for levying tolls have thus far remained unchanged.

It will be remembered that under present law and regulation tolls are based on canal tonnage, at the rate of \$1.20 per net ton, except when this product exceeds the registered net tonnage, United States rules, at a rate of \$1.25 per ton, in which case the lesser amount is collected. The confusion, lack of uniformity, and loss in revenue to the canal resulting from the present arrangement have been fully discussed in previous reports, and remedial legislation is now pending in Congress.

In this connection, attention is invited to the fact that the revenues from tolls for the past fiscal year would have been \$6,668,247.32 if canal rules alone had governed, which is \$1,036,465.66 more than the amount actually collected.

All local matters relating to transactions with the canal by ships using its facilities, as well as the actual transit through the canal, are handled by the marine superintendent through the captains of the ports, the idea being to reduce as much as possible the number of individuals with whom ships must deal, and thus simplify the business routine for the ships' officers and agents. To further this purpose, terminal office buildings have been constructed on convenient sites at each terminal port, with provision of office space for customs officers, representatives of the collector, and receiving and forwarding agents of the Panama Railroad, all of whom are concerned with some part of the business between ships and the canal. The terminal building at Balboa was occupied on July 10, 1916, and that at Cristobal on November 14, 1916.

The channel lights and buoys, harbor and range lights, the Taboguilla, Bona Island, and Punta Mala lighthouses were operated and maintained throughout the year, except that for obvious reasons the harbor lights have been extinguished since the declaration of war. On July 2, 1916, an accident to the mechanism of the gas accumulator of the Punta Mala lighthouse resulted in igniting about 10,000 cubic feet of dissolved acetylene gas. The intense heat destroyed the tank house, but fortunately did no damage to the legs of the lighthouse tower. A temporary light was installed on July 5, and permanent conditions were restored on September 9.

Two pilot boats, 40 feet long, with a speed of 18 knots, and two 85-foot steel supply boats, all constructed in the canal shops, and a sailing launch, transferred from the Navy Department, were acquired by the division during the year.

The board of local inspectors, under the supervision of the marine superintendent, investigated all cases of accident, from whatever cause, resulting in serious damage to shipping in Canal Zone waters and whenever possible fixed responsibility and estimated the cost of repairs. The board made the usual semiannual inspections of all floating plants obtaining to the canal and railroad in Canal Zone

waters. The details of the board's operations are described in its report, Appendix B.

DREDGING DIVISION.

The dredging equipment in operation during the year comprised the following: The seagoing suction dredge *Culebra*; 18-inch pipe-line dredge *No. 4* until its permanent retirement from service, on December 8, 1916; the 20-inch pipe-line dredges numbers 82, 83, 84, 85, and 86; the 15-yard dipper dredges *Cascadas*, *Gamboa*, and *Paraiso*; the ladder dredge *Corozal*; the French ladder dredges numbers 1 and 5 to October 30, when they were retired from service; and the French ladder dredge *Marmot*. The drill barge *Teredo No. 2* was operated from time to time at Culebra and Cucaracha slides, at the dry-dock cofferdam, Balboa, and at the Pacific entrance. The rock breaker *Vulcan* was engaged in breaking rock in the uncompleted section of the canal prism in the vicinity of Gamboa Dike and between Stations 1445 and 1460 and was retired from service on October 12, 1916. The floating hydraulic graders numbers 1, 2, and 3 were engaged for the most part in sluicing, ditching, and grading operations at the Culebra slides. The floating compressor plant was operated to May, 1917, supplying air to the drills at work on the Cucaracha and Culebra slides.

This equipment excavated and removed during the year 15,415,885 cubic yards of material, of which 7,315,487 cubic yards were earth and 8,130,398 cubic yards were rock. The average cost of dredging per cubic yard of all classes of material was \$0.27782. Included in the cost, but not in the yardage just stated, is a total of 648,519 cubic yards of material that was handled twice by the dredges, which, when taken into consideration, reduces the actual unit cost of dredging to \$0.25662 per cubic yard.

In maintenance work there were removed by dredges in Cristobal Harbor and in the canal from the Atlantic entrance to Gatun locks 183,904 cubic yards; between Gamboa and Pedro Miguel locks, 8,149,634 cubic yards; in Miraflores Lake, 448,385 cubic yards; and between Miraflores lock and the Pacific entrance, 978,426 cubic yards.

The year's dredging chargeable to construction, which includes all the excavation in the canal prism at locations where the full widths and depths have not been once obtained is as follows: Gaillard Cut, 183,904 cubic yards; Between Gamboa and Pedro Miguel lock, 246,998 cubic yards; and Pacific entrance, 221,138 cubic yards. At the end of the year there remained 1,409,140 cubic yards of original excavation to be done within the limits of the canal prism.

In addition to the work in the canal prism, there was miscellaneous dredging done in the terminal harbors in connection with the con-

struction of the terminal structures and their approaches from the canal and in reclaiming swamp areas by hydraulic fill for the health department. The amount excavated in this miscellaneous work is included in the total output of the year of all the dredges above reported, as are also the 268,897 cubic yards of sand and gravel excavated at the gravel beds in the Chagres River for use in concrete construction throughout the canal work.

Report has heretofore been made of the dikes and groins built on the south shore of Limon Bay, west of the canal, for the prevention of bank erosion and the consequent silting of the canal in the vicinity. Further experience confirms the efficiency of these constructions.

Work of destroying water hyacinths was continued with the same plant and methods as heretofore. Two hundred forty-seven thousand five hundred and fifty-seven square yards of hyacinths were killed by arsenic spraying and 385,700 young plants were pulled and destroyed. There is no menace to canal navigation from these pests, but due vigilance is exercised to prevent their getting a start.

An important part of the work of the dredging division has again been the removal of material from the sliding areas in the Culebra section of Gaillard Cut. Aside from the fact that during the year there was an easily navigable channel available, with but two interruptions of a total of 10 days, as compared with the entire closure of the canal from October, 1915, to April 15, 1916, perhaps the best indication of the improved condition is that the removal of 6,834,072 cubic yards from the Culebra slides during the year has resulted in a prism of full depth and the full width of 300 feet throughout, with increased widths of from 200 to 500 feet at the points of former maximum activity. During the year ended June 30, 1916, 11,210,141 cubic yards were removed from the same section of the canal. In July, 1916, 1,073,675 cubic yards were removed, and in June, 1917, 341,568 cubic yards. The West Culebra slide has been quiescent throughout the year, the volume between the peripheral break and the canal having settled to such an extent as to give indications of having reached a condition of stability. The East Culebra slide is still in motion, with occasional periods of increased activity and intervals of comparative rest. Each active period results in a settlement of the entire mass within the limiting break and a horizontal motion toward the center of the bowl-shaped area. Since the dredges have succeeded in excavating the east bank several hundred feet outside of the limits of the canal prism, recent movements of the mass have no longer produced upheaval of the bottom within the prism, or shoals within the canal by the flow of material from the bank, and after every movement the dredges, working outside the limits of the prism, have had no difficulty in excavating the material

before it reached the channel. The ultimate condition of stability will evidently be reached when the broken mass has settled to a surface not far from horizontal with a nearly vertical bluff at the limiting break. Accompanying the report of the resident engineer (Appendix C) is a contour map of the slides, Plate No. 23, showing their configuration on July 1, 1917, with comparative cross sections at typical points showing conditions as they existed at the beginning and at the end of the year, Plate No. 24. All told, 23,259,909 cubic yards of material have been removed by dredges from the Culebra slides (east and west), and Mr. Comber estimates that 3,600,000 cubic yards yet in motion will have to be removed. The points established last year, at the request of the Chairman of the Slide Committee of the National Academy of Sciences, on Gold, Zion, Contractors, and Purple Hills and at the bases of Gold and Contractors Hills, have been checked from time to time. No indication of movement of the points has been detected. Extension of the peripheral breaks of the east bank have occurred, so as to increase the area of the east slide by 3 acres. The amount of material involved in these extensions is relatively insignificant, and on account of the distance from the canal it is improbable that any of it will reach the prism.

Cucaracha slide has given no further trouble since the large movement that blocked the canal in August, 1916, as described in the report of last year. To reduce the chances of interruptions to traffic due to future similar movements if they occur, the material in the slide was removed for a distance of 100 feet outside the canal prism.

It is believed that in the future the great slides of the canal will be of historic interest only.

For details of the work of the dredging division, reference is invited to the report of the resident engineer, Appendix C.

MECHANICAL DIVISION.

The mechanical plants continued as heretofore, with the addition of Dry Dock No. 1, at Balboa, which was turned over to this division for operation on May 15, 1916. On account of the large reduction in the amount of steam-shovel work and the resultant retirement from service of railroad rolling stock, the presence of certain naval units requiring repairs, and other causes, the activities in the field and shops show a decided tendency toward marine work. The marine work was 37.6 per cent and the railroad work 21.8 per cent of the total work of the division. The larger part of the railroad equipment repair work was done in overhauling and repairing for shipment 15 locomotives, 100 lidgerwood flat cars, 2 unloaders, 40 Oliver dump cars, and 2 steam shovels, all transferred from the canal to the Alaskan Engineering Commission. An additional outside order,

which was still in progress at the end of the year, was the repair and preparation for shipment of 95 locomotives, retired from service on the canal and sold to A. B. Shaw, of 49 Wall Street, New York, N. Y., the terms of the contract providing that the repairs and packing for shipment be at the expense of the contractor. More than one-half of this work was completed by the end of the year, and progress is being made at the rate of 10 locomotives per month.

Other construction and repair work included 15,000 linear feet of steel cylinders for the foundations of Pier No. 6, at Cristobal; 2,000 feet of penstock piping for the enlargement of the hydroelectric station at Gatun; construction of two 65-foot dispatch boats for the dredging division and of two 85-foot supply boats for the marine division; the manufacture of four electric towing locomotives for the locks; extensive overhauls of the tugs *Bohio* and *Gatun*; repairs to the steamships *Lautero*, *Themis*, and *Nicaraguan*; and the overhaul of the four Hamburg-American Line ships in Colon Harbor that were seized after the declaration of war. At the Balboa dry dock there were docked for the canal 34 pieces of floating equipment; for the War and Navy Departments, 15 vessels, with a total tonnage of 94,180; and for commercial lines 18 vessels, with a total tonnage of 73,307. At the Cristobal dry dock 51 pieces of equipment were docked for the canal; 16 for the War and Navy Departments, with a total tonnage of 2,563; and 15 with a tonnage of 16,097 for commercial lines. On account of the facilities afforded by the Balboa shops and dry dock and the congested condition of the shipyards in the States, upon the recommendation of the superintendent of the division the suggestion was made to Government departments interested that the mechanical division of the canal might be considered available for a limited amount of construction and repair work that would, under usual circumstances, be performed in the States. As a result the construction of a 120-foot coast-guard cutter for the Navy Department is under way, and the extensive overhaul of the steamers *Ancon* and *Cristobal*, operated by the Panama Railroad, will be undertaken at the Balboa dock and shops. Additions and improvements, as foreshadowed in the report of last year, have been made to the Balboa shops' equipment as follows: The Balboa roundhouse has been enlarged; an instrument repair shop has been added to Building 9; a new pattern shop, with restaurant on the second floor, has been constructed; and the car shop, oxy-acetylene plant, and pipe shop have been enlarged. Building 29, inclosing the dry-dock pumping plant, electrical switchboard, and air compressors for the Balboa shops, has been completed and its equipment installed. A 120-inch engine lathe, 42-inch mill and planer, 50-ton dry-dock crane, and additional machinery and hand tools have been purchased and delivered.

On account of the diminishing amount of dredging work required in Gaillard Cut and the reduced concentration of dredging equipment in that part of the canal, the work in the Paraiso shops was much reduced. The force was reduced to about one-third of its previous size, a part being sent to Balboa shops and a part to Cristobal, and most of the work formerly done on the dredging equipment at the Paraiso shops was distributed between Balboa and Cristobal, as was most convenient.

At the time the construction of the Balboa dry dock was determined upon the project contemplated a smaller dock, No. 2, parallel and in close proximity to the 1,000-foot dock. The construction of the smaller dock was suspended until the necessity for it should become sufficiently apparent to justify an appropriation of funds for the purpose. Experience has indicated that when the smaller dock is required it should be located at or near the Atlantic terminus of the canal. Investigations are in progress, including borings, to determine the character of foundations to develop the most favorable site. Besides considerations concerning the requirements of commercial shipping, the establishment of the large submarine base at the Atlantic end of the canal would in itself determine the advisability of a dry dock there. The old French dry dock near Mount Hope, somewhat enlarged early in the construction period of the canal, is only 300 feet long and 50 feet wide, and is of sufficient capacity to accommodate only the smallest types of vessels. The Cristobal shops are not equipped to handle the heavier marine work, and the buildings are dilapidated from age. New buildings and additional equipment will be required in connection with the dry dock when constructed, and in advance of its construction, to care for the increased marine repair work that has developed. For further details of the operations of the mechanical division, see report of the superintendent, Appendix D.

SUPPLY DEPARTMENT.

Labor.—The total force of silver employees of all grades employed on the canal on June 30, 1917, was 24,146. This represents about the average force throughout the year; fluctuations occur from time to time as work is completed or new work begun. The available supply on the Isthmus has been more than sufficient to meet our demands, and no recruitment of contract labor has been done.

Quarters.—The completion of the program of new quarters authorized has materially reduced congestion. On June 30, 1916, there were 736 applicants for family quarters on file, and on June 30, 1917, 257, distributed, as follows: Ancon-Balboa, 126; Paraiso-Pedro Miguel, 8; Gatun, 2; and Cristobal, 121. The completion of the 105 apart-

ments at New Cristobal in July, 1917, further reduces the list of applicants unprovided for to 152. Including these 105 apartments, 585 new apartments for gold employees and 353 for silver employees were provided. On account of the cheap production of electricity at the hydraulic station, experiments have been made with the installation of electric ranges in a few quarters, as a substitute for coal-burning cooking stoves. Data are not yet sufficient to determine the advisability, from an economic point of view, of using electricity as a fuel in all quarters. It would appear that a sufficient number of family quarters are now provided for the permanent gold force, except in the Cristobal district. The situation in that district is complicated by the fact that many of the old French quarters at Cristobal are greatly deteriorated from age and the expense of maintenance is high. Furthermore, the encroachment of the business buildings upon the residential section of Old Cristobal will make it necessary to demolish the old quarters at that place. To provide for the operating force of the canal when there is no doubt as to the permanency of the location, the concrete type of construction for quarters has proved to be satisfactory and economical in the long run. It would seem to be a proper policy to provide quarters of permanent construction at the new town site as the old French quarters at Cristobal are condemned and destroyed. Bachelor quarters are not adequate at either terminal city to provide for the present force, and ultimately concrete quarters of a type similar to the set constructed at Ancon in 1916 should be provided for bachelors, so as to permit the assignment of one individual to a room. Quarters should also be provided for the permanent force of silver employees. Unrest in the common-labor class, due largely to the expense of hiring rooms in the cities of Colon and Panama, has been apparent from time to time.

Corrals.—There was a decreased demand for animal-drawn transportation, principally in the municipal engineering and building divisions. The operation of automobile trucks and gasoline vehicles has proved to be more economical. Seventy-five animals were purchased, 22 horses and 38 mules died or were destroyed, and 1 horse was surveyed, condemned, and sold. Including 134 horses and 51 mules at work in the pastures and plantations, the total number of animals on June 30, 1917, was 533, of which there were 183 horses and 350 mules.

Materials and supplies.—A total of 1,347 requisitions were prepared and forwarded to the general purchasing officer, as compared with 1,776 during the previous year. The total value of material received was \$10,817,106.51, as compared with \$9,945,390.32 for the preceeding year; local purchases cost \$1,516,914.79, as compared with \$1,569,812.15 for last year. There was a marked increase in price of all staple articles and material purchased. The value of material

in stock on June 30, 1917, was \$6,326,611.90, as against \$4,198,392.34 on June 30, 1916, not including the stock of obsolete material and scrap. The total issues of material from storehouses was \$12,083,926.25, as compared with \$9,028,564.07 for last year. The increase in value of stock on hand is attributable to the constantly increasing cost of material and supplies and to the necessity for increasing the stock of articles such as paints, rope, etc., for sale to steamships, to the policy of carrying a six-months' supply of gasoline, oils, grease, etc., on hand at all times, owing to uncertainties of delivery on account of war conditions, and also to the increased amount of ship work being performed by the mechanical division, making it necessary to increase the stock of steel. Sales to Government departments and to commercial steamships totaled \$593,623.00 in value, which is an increase of \$157,543.20 over the previous year; sales to steamers increased by an amount of \$180,755.41; sales to the Army amounted to \$211,466.05; and to the Navy, \$27,760.38. The principal items sold to the Army and Navy were lumber, building material, general hardware, gasoline, and kerosene. The consumption of cement for the year was 270,053 barrels. Details of the collection and disposition of obsolete material, equipment, and scrap are contained in the report of the chief quartermaster, Appendix E.

Fuel-oil plants.—The contract with the Standard Oil Company of California expired on June 30, 1917, with one order remaining for delivery at Balboa of 85,000 barrels on or before August 3, 1917. New contracts for the following year were entered into with the Standard Oil Company of California for delivery at Balboa of 700,000 barrels, at \$1.60 per barrel, and with the Atlantic Refining Company for 240,000 barrels for delivery at Cristobal, at \$2.09 per barrel. To provide for the increased storage of oils, two 55,000-barrel capacity tanks, one at Cristobal and one at Balboa, were leased from the Panama Canal Storage Corporation. The West India Oil Company completed a tank at Balboa with capacity of 65,000 barrels, and a 55,000-barrel tank was completed at Cristobal for The Panama Canal. The total fuel oil handled by the plants at Balboa and Mount Hope tank farms amounted to 2,975,223 barrels for 406 vessels, an increase of 719,104 barrels and of 96 vessels receiving oil, as compared with the previous year.

Gasoline.—Gasoline was stored in bulk in tank No. 31 at Balboa, and 81,895 gallons were drawn from storage.

Subsistence.—The commissaries of the Panama Railroad continued under the management of the supply department of the canal. The policy of making the canal as nearly as possible independent of outside sources of supply of foodstuffs has been considerably developed in the effort to keep down the cost of living. The cattle industry has been particularly successful in this regard. The value of native beef

produced increased from \$446,882.69 to \$927,551.06, and the consumption varied from 3,843,377 pounds in 1916 to 7,117,613 pounds in 1917. The fresh beef imported from the United States decreased from 3,237,598 pounds in 1916 to 1,832,714 pounds in 1917. In the development of pastures for fattening cattle 23,000 acres have been cleared, planted in grass, and fenced. Cattle have been purchased in Colombia, and the cattle ship *Caribbean* has brought in 14,032 fat cattle and 1,637 varying from 1 to 3 years in age. As the result of the cattle industry in the Zone, it has been possible to sell to employees beef at the following prices, as compared with the prices for fresh beef imported from the States.

Comparative prices of beef, American and native, prevailing at the close of the fiscal year.

	American (per pound).	Native (per pound).
Beef suet.....	\$0.05	\$0.05
Soup beef.....	.05	.05
Soup bone.....	.03	.03
Stew beef.....	.07	.07
Rib roast (3 pounds up).....	.39	.15
Pot roast.....	.37	.14
Rump roast.....	.37	.15
Porterhouse roast.....	.40	.20
Round steak, bottom.....	.28	.13
Round steak, top.....	.31	.14
Sirloin steak.....	.38	.15
Sirloin steak (choice cut).....	.41	.19
Rump steak.....	.37	.15
Porterhouse steak (1½ pounds up).....	.42	.22
Porterhouse steak (short).....	.38	.18
Tenderloin steak.....	.53	.35

In the gardens and plantations, the development of which has been begun, it is expected to grow the following products in sufficient quantities to provide for the Canal Zone population: Cocoanuts, cacao, plantains, bananas, mangoes, grapefruit, limes, oranges, alligator pears, papayas, breadfruit, corn, yams, yampees, sweet potatoes, yucas, peanuts, melons, beans, tomatoes, okra, eggplant, lettuce, cucumbers, and other small vegetables. Other operations designed to produce food supplies locally include a hog farm, chicken farm, and dairy. These are in the early stage of development and are as yet not sufficiently advanced to have an appreciable effect upon the prices of the commodities concerned.

The net revenue for the year from restaurants and messes was \$641,067.59, a decrease of \$19,950.31 from last year. The total cost of operations was \$634,150.33, a decrease of \$14,415.06. The profits were \$6,917.26, a decrease of \$5,535.25 from last year. No charge has been included for repairs to buildings, fuel, light, etc., in arriving at these figures. The Tivoli Hotel, owned and operated by the canal, showed a net profit of \$1,084.86, as compared with a net profit of

\$17,007.51 for last year. The Washington Hotel, which is owned and financed by the Panama Railroad but operated by the canal, showed for the first time a profit on operations. The profit for the year was \$2,464.99, as compared with the loss for 1916 of \$12,454.70. The Washington Hotel is now becoming of more service to the traveling public, and the increased business is largely due to the fact that the steamship lines operating down the west coast of South America have made Colon their terminal point. Some of the increased business at the Washington Hotel has been at the expense of the Tivoli Hotel, for the reason just stated. Prior to the 1st of February the tourist traffic at both hotels was heavy, but it has practically ceased on account of the war. On account of the failure of appropriations for the construction of the new Tivoli Hotel it has been necessary to authorize the expenditure of about \$75,000 for repairs to the present structure.

Mount Hope printing plant.—The value of the stock on hand on June 30, 1917, was \$81,767.72, as compared with \$53,407.02 for last year. There were added to the equipment of the plant during the year items amounting in value to \$8,409.80. Unserviceable items to the value of \$174.76 were surveyed and disposed of, and the total value of equipment on hand June 30, 1917, was \$46,132.61, as compared with \$37,897.57 for last year. The total value of material issued from the plant was \$87,482.47, as compared with \$78,115.24 for the preceding period. This printing plant manufactures and supplies various forms, record books, correspondence paper, and other similar supplies for the canal and railroad, and prints The Panama Canal Record.

For further details of the work of the supply department, attention is invited to Appendix E.

ACCOUNTING DEPARTMENT.

The organization of this department has continued as described in the annual report of 1916, except for changes that were made on account of the death of Mr. Ad Faure, chief accountant, who had faithfully served the canal in an important accounting capacity since 1905. The auditor, Mr. H. A. A. Smith, continued in direct charge of the auditing and accounting division. The division of disbursement remained under the paymaster, Mr. John H. McLean, and the division of collections under the direction of Mr. T. L. Clear.

Disbursements were made by the paymaster to the amount of \$28,150,610.55 during the year, of which amount \$9,363,739.34 were on account of the Panama Railroad. Employees on the gold roll of the canal were paid \$6,206,950.72 and those on the silver roll \$5,914,259.72. Collections by pay-roll deductions were made from

employees in the sum of \$4,028,566.94; of this amount the sum of \$3,822,212.07 was collected for commissary coupon books and meal tickets and \$55,025.07 for rent of quarters by silver employees. The Commercial National Bank, of Washington, D. C. (Panama branch), has continued as a Government depository, and small deposits of both Government and Panama Railroad funds are carried in this bank. On account of the failure of two local banks other banks found it desirable to increase their cash balances, thus reducing materially the supply of cash in local circulation. This made it necessary to import from the United States more money than usual, and \$1,425,500 in United States currency were imported by the canal. By arrangement with the Republic of Panama 1,000,000 pesos Panaman coin (equivalent to \$500,000 United States currency) were withdrawn from circulation and replaced with gold coin. The large bulk necessary to be handled in making payments with the Panaman silver made this retirement advantageous to the canal.

The collections during the year repaid to appropriations amounted to \$7,844,602.02. Deposits for the payment of tolls and bills for supplies and services were made with the Assistant Treasurer of the United States by shipping agents and interests to the credit of the collector of the canal in the sum of \$3,623,334.93. Similar deposits were made with the collector on the Isthmus in the sum of \$6,641,140.92. Of the total amount thus deposited, the sum of \$593,677.89 was refunded upon settlement of accounts. Money-order funds to the amount of \$1,676,500 were transferred to the Postmaster General in the United States in payment of money orders drawn on the United States by the Canal Zone post offices.

Under the provisions of section 3 of the sundry civil act of March 3, 1915, two employees detailed by the Treasury Department, one from the Office of the Auditor for the War Department and one from the Office of the Comptroller of the Treasury, made the required semiannual examination of accounts on the Isthmus.

The act of June 12, 1917, authorized a refund of amounts erroneously collected as tolls prior to the ruling of the Attorney General that the tolls collected under the Panama Canal rules of measurement shall not exceed \$1.25 per net registered ton, as determined by United States rules for measurement.

Small claims for damages to vessels passing through the locks have been paid in accordance with the provision of section 5 of the Panama Canal act; also a few claims for damages arising in the canal and harbors. The sum of \$2,368.12 has been paid in settlement of five claims. All claims have thus far been adjusted and settled by mutual agreement without recourse to the courts.

The total amount appropriated by Congress to June 30, 1917, for the canal and its fortifications was \$439,002,360.22. Of this amount,

\$28,580,347.30 were for fortifications, \$1,500,000 to cover annual payments of \$250,000 each to the Republic of Panama for Canal Zone rights, and \$6,000 for the expense of presenting the launch *Louise* to the French Government. The sum of \$23,890,000 has been specifically appropriated for the operation and maintenance, sanitation, and civil government of the canal and the Canal Zone. In addition thereto the act of August 1, 1914, makes the amounts therein appropriated for the construction of the canal available for expenses of maintenance and operation. The sum charged against operation and maintenance, in accordance with this authority, was \$4,289,159. Under authority of the same act the sum of \$2,225,000 of general appropriations has been expended in the purchase of a stock of materials and supplies for the operation and maintenance of the canal. Experience has shown that this sum of \$2,225,000 is too small to cover the value of stock required for operation and maintenance and for sale to ships using the canal. Under appropriations for construction, materials and supplies for construction purposes have been purchased and additional purchases have been made from funds for operation and maintenance, so as to make the total value of stock on hand at the end of the fiscal year \$6,663,458.99; when the constructions are completed and the materials and supplies absorbed therein a sufficient stock can not be maintained for operation and maintenance unless future appropriations make provision therefor. It is apparent that the stock of materials must be maintained at not less than \$5,000,000 to supply the needs of operation and maintenance of the canal, construction and work performed by it, and its commercial operations.

Deducting from the total canal appropriations all appropriations for purposes other than construction, there remains a total of \$378,511,853.92 appropriated for the construction of the canal and its immediate adjuncts. Of this amount \$3,600,000 appropriated for colliers and coal barges, \$1,500,000 for Dock No. 6 at Cristobal, \$300,000 for work on the colliers *Ulysses* and *Achilles*, and \$720,000 for reboiling and repairing the steamships *Ancon* and *Cristobal*, were specifically exempted by law as a charge against the authorized bond issue. This leaves as chargeable against the bond issue for the construction of the canal a total of \$372,391,853.92 thus far appropriated. The ultimate cost of the canal will be further reduced by receipts of sale for construction material and equipment, and by payments to be made by the Republic of Panama for amounts expended on account of waterworks, sewers, and pavements in the cities of Panama and Colon. As a credit on the books, the cost of the canal is also entitled to the value of buildings and other public works, equipment and plant, transferred without actual payment therefor to the Army, the Alaskan Engineering Commission, and

the State Department. The estimated value of items thus transferred is \$1,822,514.12.

Under our agreement with the Republic of Panama, which requires reimbursement to the United States for expenditures connected with the construction, operation, and maintenance of waterworks, sewers, and pavements in the cities of Panama and Colon, the expenditures to June 30, 1917, were \$2,124,069.08 in Panama and \$2,007,368.88 in Colon, including accrued interest to date at the rate of 2 per cent per annum on the capital cost balances and on the proportionate cost of waterworks in the Canal Zone used for supplying water for the two cities, based upon the quantity of water consumed. For the work in Panama this interest amounted to \$232,573.29, for the work in Colon \$188,388.79, and for the proportionate cost of the waterworks in the Canal Zone \$82,425.65, making a total of \$503,387.73. There has been reimbursed to the United States, or is immediately due, the sum of \$2,063,031.70, leaving a balance of \$1,020,852.53 for the work in Panama and \$1,047,553.73 for the work in Colon, a total of \$2,068,406.26 payable in installments in the next 43 years.

The principal expenditures for construction work during the year were as follows:

The completion of the Colon east breakwater at a total expenditure of \$392,560.77, the principal item being \$367,946.69 for the placing of concrete blocks amounting to 81,322.1 cubic yards at an average cost of \$4.5246 per cubic yard.

Dredging from Gatun to Pedro Miguel, \$380,755.71, including the removal of 1,080,105 cubic yards of material from Gaillard Cut at an average cost of \$0.3525 per cubic yard.

From Pedro Miguel to the sea expenditures for construction and dredging amounted to \$161,316.95, the principal items covering 246,998 cubic yards of material removed from Miraflores Lake at an average cost of \$0.1464 per cubic yard; and dredging between Miraflores locks and the sea, \$127,065.79, covering the removal of 221,138 cubic yards of material, at an average cost of \$0.5745 per cubic yard.

For aids to navigation there were expended \$22,368.36, covering mooring stations in Gaillard Cut, boat landing at Gatun locks, signal station at Empire and at Sosa Hill, and five new channel buoys in Cristobal-Colon harbor.

At Pedro Miguel and Miraflores there were expended on lock construction \$11,890.42 and \$11,423.94, respectively, covering the completion and grading of back fill.

For the extension of the Gatun hydroelectric station there were expended \$104,567.08, and \$56,526.87 for operating machinery for the same; for operating machinery for the Miraflores steam electric

plant there were expended \$10,759.80; transformer substations \$64,595.83; for duct lines \$8,466.07; and for distribution lines \$2,038.96.

In the construction of the Cristobal coaling plant there were expended \$396,030.87, and the sum of \$531,761.81 was expended for the construction of Pier No. 6 at Cristobal and a small boathouse and landing between Piers Nos. 7 and 8.

In continuing the construction of the Pacific terminal \$410,155.63 were expended for dredging in the harbor, involving the removal of 1,945,860 cubic yards of material by dredges, at an average cost of \$0.1852 per cubic yard, and the pumping of 1,378,977 cubic yards of this dead material for filling swamps between Balboa and Corozal, at an average cost of \$0.0360 per cubic yard.

The principal items of work performed during the year in the completion of the dry dock at Balboa were as follows: Pumping plant, \$39,416.54, of which amount \$33,971.61 cover payments to contractors; installation of miscellaneous machinery, capstans, crane track, fittings and bilge block, and electrical and general iron work, \$275,699.87, including \$66,767.23 for the 50-ton crane, and entrance pier \$14,650.80.

For the Balboa coaling station there were expended \$278,991.01, the principal item being payments to contractors for the coal handling plant, and continuation of the erection of the stocking and reclaiming bridges and installation of electrical equipment.

Expenditures in enlargements and improvements of the Balboa mechanical shops were \$232,092.65.

For permanent town sites there were expended \$428,545.40.

For permanent buildings \$2,659,947.35 were expended, including storehouses, mess buildings, quarters, hospitals, and schoolhouses.

In the operation and maintenance of the canal \$6,788,047.60 were expended, as against \$6,999,750.15 for the preceding year. The main item of expense for maintenance was the dredging of 8,149,634 cubic yards of material from the slides in Gaillard Cut, at an average cost of \$0.3206 per cubic yard. In this same area there were expended in the preceding fiscal year \$3,513,350.06 for the removal of 12,430,209 cubic yards of material.

Locks operation and maintenance increased from \$622,293.01 during the fiscal year 1916, to \$737,430.39 in 1917. The marine division expenses increased from \$154,891.97 to \$313,036.43, this increase being largely due to increased business during the year and to expenditures incurred on account of the defense of the canal. Offsetting the total expense for operation and maintenance are total receipts of \$5,808,398.70; from tolls, \$5,631,781.66; licenses, taxes, fees, and fines \$137,189.38; and profit on business operation, \$39,427.66.

The total business operations carried on through Panama Canal funds amounted to \$7,540,160.78, the revenues derived therefrom being \$7,579,588.44. The largest items producing revenue were shop work, \$2,190,705.52; sale of material from stock, \$1,210,768.10; construction and repair work, \$996,133.38; and subsistence operations, \$783,862.97. The revenues from business operations for 1917 showed an increase of \$1,091,066.83 over those of the preceding year.

During the year 173,475 money orders, to the amount of \$3,782,-763.71, were issued, as against 171,096, to the amount of \$3,518,223.83, during the preceding year.

The act of September 7, 1916, again changed the basis of making allowances to employees of The Panama Canal and Panama Railroad on account of injuries and deaths occurring in the performance of duty. The employees of the canal and railroad are now governed by the same rules as govern the allowances to employees of other departments of the United States Government. In order to facilitate the prompt adjustment of claims, an Executive order of the President under date of September 15, 1916, places the settlement in the hands of the Governor. Compensation paid on account of injury claims is chargeable to the injury-compensation fund and not to the appropriations for The Panama Canal, as was heretofore the case. Out of 4,068 accidental injuries and 39 accidental deaths of employees, compensation was allowed in accordance with the law in 1,445 cases of injuries and 15 of deaths. The sum of \$28,739.84 was allowed on account of injuries, and the sum of \$25,907.92 on account of deaths. Of these sums \$15,845.04 were paid out on account of injuries received and \$13,961.57 on account of deaths that occurred after the new act went into effect.

Sales of coupon books to employees on pay-roll deductions amounted in value to \$3,726,495, and books were sold for cash to the value of \$1,660,000.25. Five hundred and twenty-six examinations have been made at irregular periods, as contemplated by the regulations, of accounts of all officials and employees charged with the collection, disbursement, and custody of public funds. The system of inspection of time books and timekeeping methods has been continued as heretofore.

For further details attention is invited to Appendix F.

EXECUTIVE DEPARTMENT.

The organization of this department and of the executive office continued as described in previous annual reports, with Mr. C. A. McIlvaine as executive secretary, acting under the direction of the Governor. There was an increase of 38 employees during the year, all included in the division of fire, police, and of schools. The increases were made necessary in the police department on account of

the extra vigilance required by war conditions, and in the division of schools on account of an increase in the number of pupils, requiring additional teachers. The position of superintendent of clubs and playgrounds was abolished at the beginning of the fiscal year, and the executive work formerly done by the superintendent was assumed by the executive secretary, with the assistance of the secretary of the Balboa Clubhouse. The requirements of law that wages and salaries on the canal should not exceed by 25 per cent wages and salaries of corresponding positions in Government employ in continental United States performing similar duties made necessary the compilation of data as to rates of pay in the States. Primarily for this reason a bureau of statistics was organized in the executive office, formed by placing three employees previously engaged in different offices, under the direction of an employee who had formerly been engaged on statistical work in the departmental service in Washington. All statistical work for the canal was centralized and assigned to this bureau.

BUREAU OF CLUBS AND PLAYGROUNDS.

Clubs for gold employees were operated at Cristobal, Gatun, Paraiso, Pedro Miguel, Ancon, and Balboa, and for silver employees at Cristobal, Gatun, and La Boca. A new clubhouse was opened at Paraiso on March 31, 1917, and a club for silver employees at Cristobal on May 5, 1917.

At Balboa the baseball park and athletic field were completed, including the construction of a reinforced-concrete stadium. Playground apparatus was installed on the grounds at Balboa for the use of children. At the clubhouses it has not been necessary to bring down from the States as many entertainers as has been the practice in the past, largely on account of the increased use of moving pictures as forms of entertainment. The number of entertainments by local amateurs has been increased. Moving-picture exhibitions have been provided from time to time, without entrance fee, to the leper colony at Palo Seco, the Corozal Insane Asylum, and the penitentiary at Gamboa. The superintendents of these institutions report favorable results of these exhibitions. During the year 11,648,000 feet of moving-picture films were shown at the various clubhouses.

DIVISION OF CIVIL AFFAIRS.

This division includes administration of post offices, customs, shipping matters, local licensing, estates of deceased and insane employees, and immigration matters. There were 16 post offices in operation during the year: a post office at Fort Grant was opened on July 1, 1916, and made a money-order office on August 16, 1916; the

post offices at Fort Randolph and Fort Sherman were constituted money-order offices on November 1, 1916. The total revenue for the postal service, including box rents and payment from the Panama Railroad and its commissaries, was \$110,741.41, giving an increase in receipts over 1916 of \$13,886.15. Approximately 58 per cent of mail matter handled by the bureau of posts is official matter of The Panama Canal, from which no revenue is received. Under the Taft agreement, which is still in force, a payment of \$29,789.63 was made to the Panaman Government as a credit to its general indebtedness to the canal, this amount being 40 per cent of the total receipts from sales of Canal Zone stamps. There were 173,475 money orders issued during the year, amounting in value to \$3,782,763.71, on which fees amounted to \$12,371.28. Compared with the preceding fiscal year, there was an increase of 2,379 in the number of orders issued, an increase of \$264,539.08 in the value and a decrease of \$507.01 in the fees collected. The decrease in fees is due to the increased number of deposit money orders issued on which no fee is collected. On June 30, 1917, there was on deposit the sum of \$355,097.10, covering unpaid money orders issued by and drawn on Canal Zone post offices in favor of the remitter. Deposit money orders during the year were issued to a total value of \$1,481,845, and payments of deposit money orders during the same period aggregated \$1,136,115, leaving a balance on deposit on June 30, 1917, of \$696,380. On June 30, 1917, the balance of old postal saving certificates held by the accounting department amounted to \$1,769. The total cash transactions of the bureau of posts for the year amounted to \$6,559,284.59. Under the provisions of the act of Congress of August 21, 1916, providing for the payment of interest at the rate of 2 per cent per annum on all deposit money orders issued in the Canal Zone, an amount of \$1,813.93 was paid as interest on deposit money orders cashed up to June 30, 1917. During the year 240,022 parcels and letters were handled in the registry division of the post offices. Of this number, 127,417 were dispatched, including 20,854 domestic letters, 4,243 domestic parcels, 22,994 foreign letters, 2,198 foreign parcels, 73,696 official letters and parcels registered free, and 3,432 letters and parcels reregistered free. Compared with the preceding fiscal year, there was an increase of 2,718 registered letters and parcels dispatched. There were delivered during the year at all post offices 112,605 registered, insured, and C. O. D. parcel-post packages, an increase of 5,449 over the previous year.

Effective November 1, 1916, under agreement with the United States Post Office Department, all transit United States mail and closed foreign mail via the United States destined to the west coast of Central and South America, was consigned to the care of the director of posts of the Canal Zone. During the eight months in which this arrangement has been in force there were received and

dispatched a total of 55,678 sacks of transit mail from New York and New Orleans. Of this total 47,770 sacks originated in the United States and 7,908 sacks in foreign countries. On October 1, 1916, arrangements were effected for the disposition of all local unclaimed mail, in accordance with the postal laws and regulations, by the director of posts, and the former practice of forwarding all unclaimed mail to the Dead Letter Office at Washington, D. C., was discontinued.

BUREAU OF CUSTOMS.

The bureau of customs has been conducted under regulations heretofore in force. This bureau is now charged with the duty of carrying out the provisions of the Executive order of February 6, 1917, relating to the exclusion of Chinese. During the fiscal year 480 prohibited aliens arrived at Balboa and 227 at Cristobal in transit to the Republic of Panama and other countries.

During the year there were 10 arrests for attempted smuggling of opium, resulting in 7 convictions.

The bureau of customs certifies invoices covering ordinary shipments from the Canal Zone to the United States, using forms identical with those prescribed for certification by American consuls at foreign ports. There were 1,169 such invoices certified during the year. There were 380 inspections of household goods and miscellaneous effects of American manufacture inspected and sealed before shipment to the United States in accordance with the agreement with the officials of the United States Treasury Department. Under authority of section 8 of the act of Congress of August 21, 1916, providing for the collection of fees for services performed by Canal Zone customs officers, the amount of \$243.50 was collected at Balboa and \$359.50 at Cristobal as canal revenue.

The total number of vessels entering Canal Zone ports was 3,718, and the total number cleared was 3,721, as compared with 2,130 entered and 2,123 cleared during the preceding year.

There were 3,745 seamen shipped on American vessels and 3,430 seamen discharged, as compared with 2,631 shipped and 2,375 discharged during the previous year.

One hundred and eighty-nine estates of deceased and insane employees of The Panama Canal and Panama Railroad were administered, and 22 estates were in process of settlement at the end of the year. The amounts involved were \$8,568.14.

During the year 2,323 licenses and permits were issued, of which 1,862 were for motor vehicles. Under the Executive order of September 5, 1916, prescribing motor-vehicle regulations for the Canal Zone, license fees for motor vehicles were considerably reduced. The total sum collected for licenses and fees of all kinds issued by the division of civil affairs was \$9,480.80.

POLICE AND FIRE DIVISION.

The number of first-class policemen was increased from 98 to 119 on July 1, 1916, in order to provide proper protection to canal structures; and on February 4, 1917, 39 additional first-class policemen were employed for the same purpose. These men were largely recruited from the military forces on the Isthmus who were furloughed or obtained their discharge upon the termination of their services.

On the eve of the entry of the United States into the war, the additional men were returned to the Army and a large part of the work performed by them was transferred to the Military Establishment. Motorcycle patrols, for the enforcement of automobile speed and operation regulations and for special emergency police service, were continued throughout the year at Balboa and Cristobal. Monthly patrols were made of the interior sections of the Canal Zone from time to time.

In addition to the usual police work, officers of the force conducted numerous and extensive investigations in connection with the protection of the canal.

During the year 4,881 persons were arrested, of whom 4,659 were males and 222 were females. Eighty-one persons were deported from the Canal Zone. Coroner's investigations were made in 68 cases of death, of which 30 were due to accidental drowning, 20 to accidental traumatism, and 18 to other causes. Thirty-eight convicts were received at the penitentiary during the year, a decrease of 21 as compared with the previous year. Fifty-four convicts completed terms of imprisonment and were discharged. At the end of the year 35 convicts remained in custody, as compared with 61 at the close of the previous year. The convicts were employed on the construction of new roads between New Culebra and Gamboa, on a small farm of about 20 acres adjacent to the penitentiary, and on labor inside the prison in the maintenance of prison buildings and grounds. The total value of labor performed by convicts amounted to \$7,237, at the rate of \$0.12 per hour. The total cost of subsisting and guarding the convicts was \$17,030.05. The total value of labor performed by common jail prisoners amounted to \$12,879.80, at the rate of \$0.10 per hour, of which \$4,940 cover labor performed on roads, \$6,475 janitor services, and \$1,464.80 miscellaneous work. Two convicts escaped and both were recaptured; two common jail prisoners escaped and were not recaptured. Four convicts were pardoned, and a part of the sentence remitted in four cases.

The organization of the fire-fighting force remained as heretofore. On June 30, 1917, there were eight volunteer fire companies in the service, with a total of 122 men, all being employees of The Panama Canal and Panama Railroad. One hundred and four fires and nine

false alarms were reported. The total loss from all fires amounted to \$3,190.25, and the value of the property endangered from fires was \$1,044,752.

DIVISION OF SCHOOLS.

The schools opened on October 2, 1916, and closed on June 30, 1917. The average daily attendance for the year was 1,709.2, of which 1,212.6 were whites and 496.6 colored. Corresponding figures for the preceding year were 1,501.4, 1,065.1, and 436.3, respectively. The total number of white teachers employed during the year was 52, as compared with 43 during the preceding year. There were 14 colored teachers employed; no increase over the preceding year. The usual physical examination of pupils in the white grade schools was conducted. Physical training in the white schools at Balboa and Ancon was continued, under the direction of the physical director of club-houses. The teaching of Spanish was continued in the last five grades of white schools. To the industrial training branch there was added a course in domestic science for girls. The manual-training course consisted of instructions in woodwork, mechanical and architectural drawing, elementary metal work, and foundry practice. In the apprentice school the total enrollment as to trades was as follows: Boilermakers, 7; blacksmiths, 2; cabinetmaker, 1; coppersmith, 1; draftsman, 1; electrician, 1; machinists, 17; molders, 2; pipefitters, 4; plumber, 1; pattern maker, 1; shipwright, 1; and shipfitters, 3. The apprentices were given special technical instruction in the shops of the mechanical division, and a number of the students continued their work during the vacation period. Forty-seven girls in the high school and 120 in the grammar schools were given instruction in domestic science, including the teaching of sewing, cooking, and general household economy. Thirty-seven boys in the high school and 63 in the grammar schools were given manual training. Nineteen buildings were used for school purposes during the year.

COURTS.

In the district court 126 cases were pending at the beginning of the year, 720 cases were filed, and 652 decided, leaving 194 cases pending on June 30, 1917. There were 128 sessions of the court. Seven hundred and fifty-six marriage licenses were issued by the clerk of the court and 84 deeds recorded. The sum of \$3,997.25 was collected in fines, costs, and fees.

In the magistrate's court at Balboa 4 cases were pending at the beginning of the year, 1,750 cases were docketed, and 1,747 were settled, leaving 7 cases pending at the close of the year. Collections on account of fines and fees amounted to \$6,489.64. In the magis-

trate's court at Cristobal 4 cases were pending at the beginning of the year, and 2,732 cases were docketed; a total of \$6,792.04 was collected in fees and fines. The report of the district attorney is printed as Appendix H. The marshal for the district court received 633 summons, writs, citations, subpœnas, etc., served 553, and was unable to accomplish 80, as the persons concerned could not be found.

RELATIONS WITH PANAMA.

Negotiations by correspondence or personal conference between the executive secretary and the secretary of foreign relations of the Republic of Panama included, outside the regular routine of office business, the following:

Removal of embargo on shipments of arms and ammunition consigned to merchants in the cities of Panama and Colon.

Preservation of neutrality of the Canal Zone and the Republic of Panama and treatment of vessels in the service of the entente powers arriving and departing from Canal Zone ports and passing through the canal.

Construction of a garbage incinerator for the city of Panama.

Police protection at Panama Railroad stables in the city of Panama, and the condemnation of certain private stables for sanitary reasons.

Additional accommodations at Santo Tomas Hospital for persons suffering from tuberculosis.

Cooperation of the Canal Zone bureau of posts in expediting the delivery of mails for the Republic of Panama.

Cancellation of saloon licenses at Gatuncillo, in the Republic of Panama, because of being near supply department plantations and causing trouble among Panama Canal laborers.

The presentation to the Republic of Panama of an old French relief map of the Canal Zone and certain maps and models of the locks for use in the School of Arts and Trades in the city of Panama.

Revision of maritime regulations in force in Panaman ports.

Ordinance respecting the registration of births, deaths, burials, and disinterments in the cities of Panama and Colon.

Reciprocal license fees on motor cars owned by residents of the Republic of Panama and operated in the Canal Zone, and on cars owned in the Canal Zone and operated in the Republic of Panama.

The importation of articles, for their personal use, by employees of The Panama Canal and the Panama Railroad Company and by the post exchanges operated by the United States Army in the Canal Zone.

Handling of Chinese passengers arriving at the port of Balboa and the exclusion of undesirable persons from the Isthmus of Panama.

The lack of enforcement of sanitary regulations in the cities of Panama and Colon.

Amendment to Sanitary Rules and Regulations in connection with the issuance of building permits for buildings in the suburban or unimproved sections of the cities of Panama and Colon.

The question of commissary privileges for members of the diplomatic corps accredited to the Republic of Panama, and the curtailment of said privileges for nonemployees.

The deportation of insane patients treated at the expense of the Republic of Panama at the Corozal Hospital for the Insane.

The selection of a site for a new slaughterhouse in the city of Colon, and the matter of slaughtering animals for Colon consumption in the Cristobal abattoir.

Arrests of Panamans for trespassing in restricted area of Balboa Harbor.

For further details see Appendix G.

LAW.

Judge Frank Feuille continued as special attorney, and as such represented the Government's interests before the Joint Land Commission, prepared drafts of Executive orders necessary to put into effect certain provisions of law, and in addition served as counsel for the Panama Railroad Company on the Isthmus. The duty of revising and codifying the laws of the Canal Zone, with which the special attorney is also charged, has not yet been completed, due in large part to a ruling of the Attorney General of the United States that the President is without power to revise presidential orders issued prior to the passage of the Panama Canal act without specific authority from Congress. Under the act of August 21, 1916, specific authority was conferred for certain revisions of former Executive orders, as follows:

1. To authorize the President to make rules and regulations in matters of health, sanitation, and quarantine for the Canal Zone.
2. To make and enforce rules and regulations for the use of public roads and highways in the Canal Zone, and for regulating, licensing, and taxing the use and operation of all self-propelled vehicles used on the public highways.
3. The act makes it unlawful for any person to make any breach of the peace or engage in or permit any disorderly, indecent, immoral, or unlawful conduct in the Canal Zone.
4. It provides that deposit money orders issued in the Canal Zone post offices shall bear interest at a rate not to exceed 2 per cent per annum.
5. It authorizes customs officers in the Canal Zone to levy fees equivalent to those prescribed by the United States consular regulations for services performed by consular officers for all certificates, marine protests, or notarial services.

6. It bestowed upon the shipping commissioner and deputy shipping commissioner of The Panama Canal the same powers, in respect to seamen of vessels of the United States, as are exercised by consular officers of the United States in foreign ports, and by shipping commissioners in the ports of the United States.

7. And finally, the act authorized the President to make rules and regulations affecting the right of any person to enter, remain upon, or pass over any part of the Canal Zone; to establish rules and regulations requiring any vessel bringing a person to the Canal Zone in contravention of law to return such person to the country whence he came; and provides that the owner of such vessel, in addition to fine and penalties authorized by law, may be required to pay all costs of the detention and return of the person whose entry is prohibited, and clearance may be withheld from such vessel from any port of the Canal Zone until the costs of the offense are paid.

Under the authority of this act an Executive order was prepared and submitted to the President for his signature, and signed by him on September 5, 1916. It prescribes the license fees to be charged to the various kinds of motor vehicles, and permits the Governor to exempt from the payment of license fees motor vehicles operated exclusively within certain areas or districts of the Canal Zone to be defined by him, and to prohibit by public notice motor vehicles from operating on such portions of the Canal Zone as he may designate, when, in his judgment, the public interests requires it; or the Governor may authorize any of the said vehicles to be operated in any areas or districts designated by him, upon such conditions as he may deem necessary or convenient to the welfare of The Panama Canal. Under the authority of the same act of Congress, the President promulgated an Executive order dated February 6, 1917, relating to the exclusion of Chinese. This order repeals the Executive order of January 9, 1908, which extended to the Canal Zone law No. 6 of 1904 of the Republic of Panama. This law of the Republic is no longer in force in the Canal Zone since the enactment of the Executive order just referred to. This order confers ample authority upon the Governor, The Panama Canal, to cooperate with the Republic of Panama in preventing the entering into that jurisdiction of Chinese in violation of Panaman law. The recent order gives more liberty to vessels carrying Chinese crews in transit in the canal than did the Executive order of January 9, 1908, which is repealed, the purpose being to make the canal as free for the transit of ships as is consistent with the safety of the canal and the preservation of the laws of the Canal Zone.

Another Executive order was issued by the President on February 6, 1917, by authority of the above-mentioned act of Congress, for the exclusion and deportation of undesirables from the Canal

Zone. This order is more comprehensive in its scope and provisions than was the former ruling, and provides a more efficient machinery for the exclusion and deportation of undesirables in the interest of public health and good order on the Canal Zone.

Under the authority of the Executive order of August 6, 1908, the law department of the Canal Zone, through the special attorney, has settled 199 claims arising out of the presidential depopulation order of December 5, 1912, and in the settlement of these claims an amount of \$140,456.66 was paid. These settlements have increased the total of claims adjusted through the instrumentality of the special attorney to 5,443 claims for damages for lands and improvements taken over by the Government for canal purposes, and the total amount paid aggregates \$1,240,926.60. These settlements are made independently of the operations of the Joint Commission.

The expenses to the canal for the operations of the Joint Commission and umpire for the year were \$42,896.99, of which the sum of \$39,509.87 was for salaries. The Joint Commission during the year made 43 awards, covering 85 claims, the awards aggregating \$171,538.30. Fifteen of these awards were for land claims and 70 for improvements only. The grand total of claims settled by the several Joint Commissions appointed under Articles VI and XV of the Panama Canal treaty is 865, and the amount paid under awards made by these Commissions aggregates \$1,152,090.64. During the year the Joint Commission dismissed 14 claims for lack of evidence; 388 claims because direct settlement had been made with the claimants by the representatives of the United States; 305 under rules of default against the claimants, who had failed to appear to prosecute their claims after due notice by publication had been given for 60 days in one of the local newspapers in the city of Panama; 8 claims were dismissed for want of jurisdiction in the Joint Commission to entertain them; 1 claim was dismissed for the reason that it was filed after the expiration of the period fixed by the rule of the Commission, with the consent of the two Governments, within which claims were required to be filed; 1 claim was dismissed because it was a duplicate of a former claim filed under another name by another person; and 10 were dismissed because they had been disposed of by awards of a previous Commission.

During the year 20 claims were certified to the umpire by the Joint Commission; 4 were withdrawn from his consideration and awards made for payment by the Joint Commission. The umpire dismissed 2 cases certified to him and disposed of 7 claims, the aggregate sum awarded by him being \$175,000. Admiral Victor Maria Concas y Palau, umpire of the Joint Commission, died on September 25, 1916, and on March 24, 1917, Mr. Manuel Walls y Merino was

appointed as his successor. Mr. Walls was selected by His Majesty the King of Spain, at the request of the President of the United States and the President of Panama. Owing to the delay incident to the preparation of records for submission to the umpire, no awards were made by Mr. Walls during the fiscal year. The number of claims remaining for the umpire's consideration is 9, of which 2 are claims for improvements only. There were, at the end of the year, 179 claims pending before the Joint Commission, including lands and improvements, an aggregate in amount claimed of \$8,929,278.85.

For reasons explained in detail in the report of the special attorney that official declined to certify an award for payment in one case, and recommended that it be protested by the United States authorities, by whom the matter is still under consideration.

On December 28, 1916, a motion was filed by the special attorney through the Joint Commission, asking that in trial of claims no evidence be admitted by the Commission respecting values except such as tended to prove values of property prior to November 19, 1903, in conformity with Article VI of the Panama Canal treaty. On May 16, 1917, the Joint Commission overruled the motion of the special attorney by a majority vote, Commissioner Bouve dissenting. The matter has been submitted, through proper channels, to the State Department, together with the opinion of the Panaman members of the Commission, and the respective opinions of Commissioners Bouve and Cornet.

At the close of the fiscal year there were 45 revocable licenses in effect, issued by The Panama Canal for lands within the Canal Zone, of which number 15 were issued during the fiscal year. These licenses include lots occupied by oil companies for oil tank sites, residences for the employees of the oil companies, church buildings, lodge halls, office buildings for steamship companies, and other similar purposes. The total rental collected under the licenses issued was \$15,008.02.

The report of the special attorney is attached, as Appendix I.

HEALTH DEPARTMENT.

The health of employees and other residents of the Canal Zone has continued good. No cases of yellow fever or plague originated on or was brought to the Isthmus during the year. On November 2, 1916, a case of smallpox in a West Indian sailor was brought to Ancon Hospital from Panama City. Two secondary cases, both in young children, occurred in the same house from which the first case came, but there was no further spread of the disease. The gross cost of the health department was \$1,023,224.34, as compared with \$942,310.44 for 1916. The revenues from pay patients and other sources amounted to \$441,303.13, showing an increase of \$51,296.42

over the revenues of 1916. There has been a very satisfactory degree of freedom from malaria in the population of the Zone; among the employees whose duties confined them to the sanitated districts the disease was almost entirely absent. The greatest number of cases arose among the employees engaged in the farms and gardens outside of the sanitated districts and among the troops whose duties required them to spend considerable time in the interior and near native towns in the Republic of Panama. In the cities of Panama and Colon the leading cause of death is tuberculosis. This disease caused the death of 5.2 per thousand for the year in Panama, and repeated representations have been made to the Panaman Government concerning the necessity for facilities for the isolation and treatment of sufferers from the disease.

The average population of the Canal Zone was 31,048, as compared with 31,384 last year. The death rate from disease in this population was 8.95 per thousand, as compared with 11.02 in 1916. The highest hospital admission rates for disease occurred in May and August and the lowest in September and November.

The city of Panama.—The average population was 60,778, as compared with 60,576 for last year. In this population the death rate from disease was 27.97 per thousand, as compared with 27.27 for the preceding year.

The city of Colon.—In Colon the average population was 24,693, as compared with 27,012 for last year. The death rate from disease was 24.54, as compared with 24.51 for last year.

DIVISION OF HOSPITALS.

ANCON HOSPITAL.

The average number of patients per day under treatment in Ancon Hospital was 770, as compared with 748 for 1916. The average number of employees per day sick in hospital was 226 for 1917, as compared with 267 for 1916. The New Board of Health Laboratory was occupied on February 28, 1917. Section B of the ward group was occupied on April 10, 1917, and the admitting office and dispensary on May 8, 1917. The remainder of the new hospital project, for which Congress appropriated in the sundry civil act for the fiscal year 1918, includes the administration building, kitchen and mess building, isolation building for contagious diseases, nurses' home, two ward buildings, and new quarters for the superintendent. The new buildings, when constructed, will give the hospital a total capacity of 610 beds, exclusive of the isolation building, with accommodations for 80 beds if necessary.

Board of Health Laboratory.—In addition to the customary routine work, the introduction of cattle, hog, and chicken industries

on a large scale by the supply department has developed the necessity for considerable research in the detection and prevention of the various diseases to which these animals and fowls are subject.

Clinics.—In the surgical clinic 1,506 major and 1,415 minor operations were performed; in the medical clinic 3,398 cases were treated; and in the eye and ear clinic 736 operations were performed, 693 prescriptions were written, and 1,225 prescriptions for correction of vision by glasses.

Grounds and police.—The construction of the new buildings, with resultant concentration, made possible the establishment of new boundary lines for the hospital reservation, which removed four family quarters, the old admitting office and dispensary, and a set of bachelor quarters from the limits of the reservation.

Corozal Hospital and farm.—The Corozal Hospital and farm remained under the supervision of the superintendent of Ancon Hospital. The hospital is for the care and treatment of the insane, of whom there were 350 patients on June 30, 1917, as compared with 291 on June 30, 1916. Several improvements were made in the personnel of the supervisory force, providing for care and treatment by doctors and nurses who have specialized in this class of work. The hospital is available for patients from the Republic of Panama, on a pay or charity basis, as circumstances require. The sundry civil act for 1918 authorized the transfer of insane patients whose American citizenship is established, but for whom no State institution is responsible, to St. Elizabeths Hospital in the District of Columbia.

At the Corozal farm there was maintained a dairy for providing fresh milk to patients in the canal hospitals, on physicians' prescriptions.

COLON HOSPITAL.

The hospital group consists of hospital and dispensary building, doctors' quarters, morgue, and garage and storeroom, all of permanent concrete construction. There remains to complete the present authorized project a set of concrete quarters for nurses, for which provision was made in the sundry civil act for 1918.

Two hundred and sixty-four major and 1,944 minor operations were performed during the year.

PALO SECO LEPER ASYLUM.

The average number of patients per day cared for was 66.21. There were 65 patients at the beginning of the year; 12 were admitted, 11 died, and 1 was discharged, leaving 65 under treatment at the end of the year. Two new ward buildings authorized last year had been completed, labor being performed by patients under

the supervision of the superintendent. One of the old ward buildings was reconstructed and fitted up as an infirmary, operating room, and dispensary, thus providing accommodations for the most serious cases requiring the constant care of an attendant. A new well for water supply for the asylum has been sunk to a depth of 147 feet, providing an ample supply of water.

SANTO TOMAS HOSPITAL.

This hospital is owned by the Government of Panama, but is operated under the supervision of the health department of The Panama Canal, the canal furnishing, at its cost, the superintendent, 2 physicians, 1 interne, and 3 nurses. The present building is inadequate in size and arrangement, and there is a great necessity for a separate building for tuberculosis cases. The Panaman Government is now considering the project of building a new hospital in the exposition grounds and abandoning the present hospital group. This is very desirable, but in the meantime there is urgent need for temporary alterations and additions to the present hospital.

DISTRICT DISPENSARIES.

Five dispensaries, not including those at Ancon and Colon Hospitals, have been maintained throughout the year. A new dispensary building of permanent type is nearing completion at Pedro Miguel; the concrete dispensary building for Gatun has been authorized and will be constructed during the coming year.

SANITATION.

Besides the maintenance of sanitary work in and around the towns in the Canal Zone, there has been extensive sanitary work done in the Mount Hope-Cristobal district. This district was formerly a center of malarial infection, and the keeping down of mosquitoes by temporary ditching and by spraying with oil was expensive and ineffective. The swamps have been reclaimed and graded by fill pumped from hydraulic dredges. The result of this work is the almost complete disappearance of the *Anopheles* mosquito and the practical elimination of malaria from employees living at the Atlantic terminal. Fill of a similar kind and for a similar purpose is nearing completion in the swamp areas between the old and new Ancon-Corozal roads.

A model oil-burning incinerator of 120 tons daily capacity is being erected on Gavilan Island, where it will serve the districts of Ancon, Balboa, and Fort Grant, as well as the city of Panama. The abandonment of the present insanitary garbage dumps will materi-

ally reduce the fly and rat nuisance. A similar incinerator, of smaller capacity, has been authorized and will be erected at Colon during the coming year.

The sanitary work in the cities of Panama and Colon is under the direction of the health officers of the respective cities, who are employed by the canal and are under the immediate supervision of the chief health officer. They are charged with the enforcement of the sanitary regulations and health ordinances prescribed by official decree of the Panaman Government at the request of the canal. These regulations provide for meat inspection, the supervision of building construction as to sanitary and structural conditions, the vaccination of the school population, the recording of birth and death statistics, the inspection of food, street cleaning, garbage collection and disposal, and the extermination of rats and flies, and, in general, preventive measures against the incidence and spread of disease.

QUARANTINE DIVISION.

The quarantine officers board and inspect all incoming steamers for the purpose of detecting and isolating persons affected with a quarantinable disease. Vessels arriving from certain ports against which a quarantine is enforced are kept in quarantine until the quarantine period has lapsed. The plague situation along the west coast of South America remains practically unchanged, and it is still necessary to enforce quarantine against the small northern Ecuadorian ports and other ports as far south as Valparaiso, Chile. Guayaquil, Ecuador, has shown the heaviest infection of both bubonic plague and yellow fever of all the coastal cities.

For further details attention is invited to the report of the chief health officer, Appendix J.

WASHINGTON OFFICE.

Unusual difficulty was experienced in securing an adequate supply of skilled mechanics in the United States for duty on the Isthmus, especially in the shipbuilding and repairing trades, due to the abnormal activities in the various manufacturing plants and ship yards. Fifty-four per cent of those tendered employment failed to accept, as against 48 per cent during the preceding fiscal year. One thousand four hundred and seventeen persons were tendered employment in grades above that of laborer, of which 767 accepted and were appointed; no decrease was experienced in the work of the correspondence and record division.

In the office of the assistant auditor of the canal on duty in the Washington office, 15,664 vouchers for payment, amounting to \$10,853,282.68, and 274 collection vouchers, amounting to \$508,257.69, and

1,249 settlements by transfer of appropriations, aggregating \$665,317.90, were given administrative examination. These figures show an increase in disbursements made amounting to \$678,688.66, an increase in collections of \$138,191.14, and an increase in transfer settlements of \$248,317.90, as compared with the corresponding figures of the preceding year. One hundred and sixty-nine contracts were prepared, involving an amount of \$5,096,989.48, an increase of 37 in number and of \$723,192.26 in amount over the figures of the preceding year.

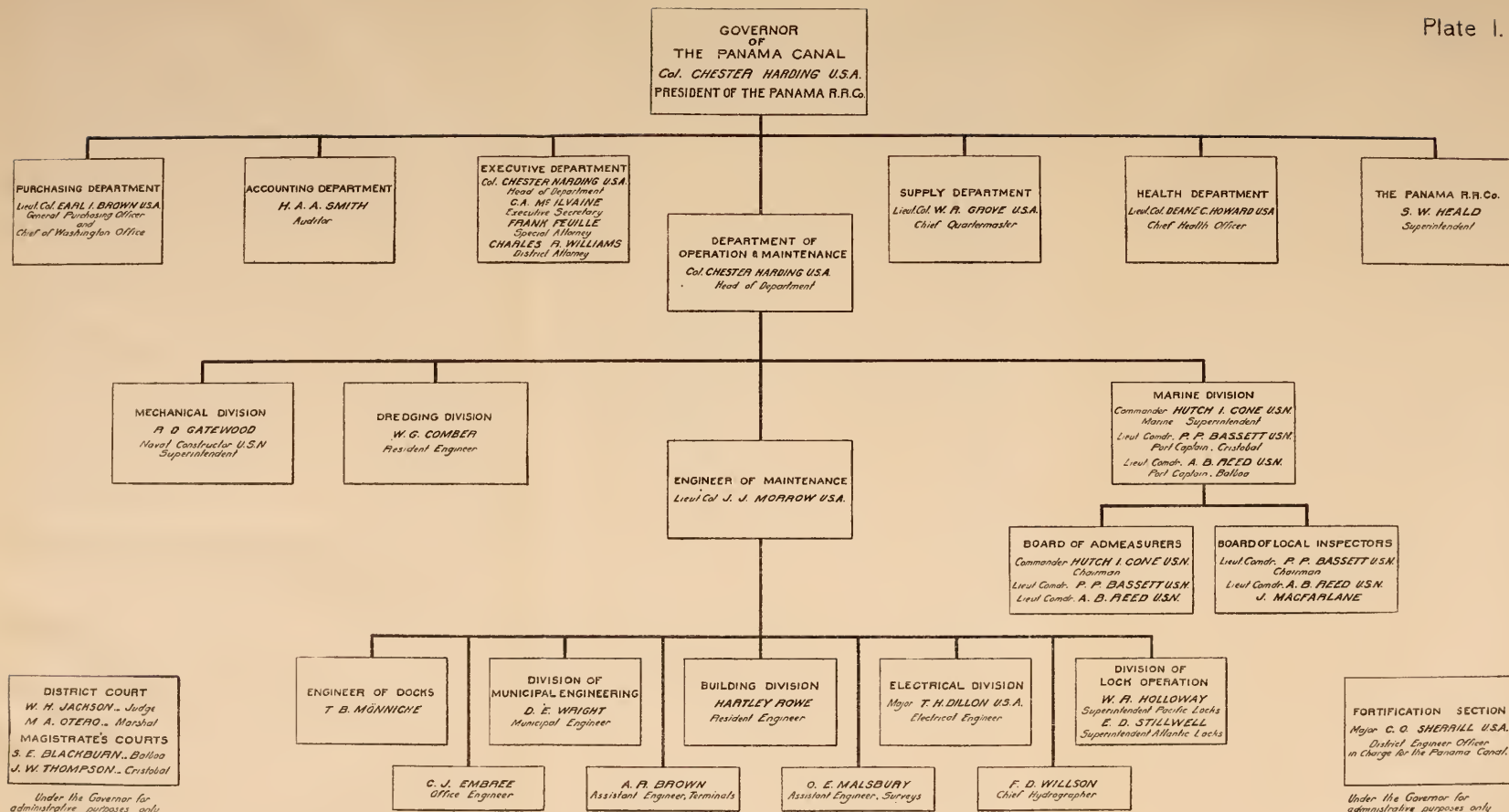
The purchasing department at the Washington office is responsible for the filling of all requisitions forwarded from the Isthmus for materials and supplies. The assistant purchasing agents have been continued at New York, New Orleans, and San Francisco, who have in addition acted as receiving and forwarding agents of such materials as have been purchased for delivery to the Isthmus on ships sailing from their respective ports. Medical and hospital supplies for the Isthmus have been purchased, as heretofore, through the Medical Supply Department, United States Army, New York City. The preliminary inspection of materials purchased has been made under the supervision of the inspecting engineer, under the direction of the general purchasing officer. The work of inspection has been facilitated, as heretofore, by assistance rendered by district officers of the Corps of Engineers and by the Bureau of Standards, Bureau of Mines, Bureau of Chemistry, and the Medical Department, Ordnance Department, Signal Corps, and the Quartermaster Corps of the United States Army. A total of 8,890 orders was placed through the Washington office of the canal during the year, as compared with 8,856 for the preceding year, the total value of the orders being \$10,403,996.08 for 1917, as compared with \$8,495,099.59 for 1916.

For further details attention is invited to Appendix K.

Respectfully submitted.

CHESTER HARDING,
Governor, The Panama Canal.

HON. NEWTON D. BAKER,
Secretary of War, Washington, D. C.



APPENDIX A.

REPORT OF THE ENGINEER OF MAINTENANCE.

THE PANAMA CANAL,
OFFICE OF THE ENGINEER OF MAINTENANCE,
Balboa Heights, Canal Zone, July 20, 1917.

SIR: I have the honor to submit the following report of work done under the jurisdiction of this office during the fiscal year ended June 30, 1917:

ORGANIZATION.

The duties of the engineer of maintenance have remained as in the past, excepting that on July 1, 1916, the construction of fortification work was transferred to the district engineer officer, United States Army; on December 1, 1916, the office of the engineer of docks was transferred from the Panama Railroad Company to this office; and on February 9, 1917, the office of the resident engineer, building division, was transferred to this office from the department of operation and maintenance.

The office was under your charge, with the undersigned as assistant to the engineer of maintenance, until January 11, 1917, upon which date the undersigned was appointed engineer of maintenance upon your vacating that office upon your appointment as Governor.

The various divisions and sections have been in charge of the following personnel:

Electrical division.—Maj. William H. Rose, United States Army, continued as electrical engineer until his relief from duty with The Panama Canal on June 1, 1917, when Maj. Theodore H. Dillon, United States Army, was appointed electrical engineer.

Building division.—Mr. Hartley Rowe, resident engineer, has been in charge of the building division since February 9, 1917, when he succeeded Mr. George M. Wells.

Locks divisions.—The Atlantic locks continued under the direct charge of Capt. T. H. Dillon, United States Army, until March 5, 1917, when Capt. E. J. Atkisson, United States Army, was appointed superintendent. Mr. E. D. Stillwell was appointed superintendent effective April 15, 1917, vice Capt. Atkisson, relieved from duty with The Panama Canal. Mr. W. R. Holloway was appointed superintendent of the Pacific locks, effective August 16, 1916, vice Mr. R. H. Whitehead, resigned.

Municipal division.—Mr. D. E. Wright, municipal engineer, continued in charge of this division.

Terminal construction.—Mr. T. B. Monniche, engineer of docks, has been in charge of the Atlantic dock construction (excepting the Cristobal coaling plant) throughout the year. Mr. F. H. Cooke, designing engineer, was in charge of the Cristobal dock construction and all Pacific dock construction work until his relief from duty with the canal, after which date Mr. Bernard Duchscher, assistant engineer, had charge of all coaling plant inspection work and Mr. A. R. Brown, assistant engineer, had charge of other construction work at

the Pacific terminals. Since April 14, 1917, Mr. A. R. Brown has also had charge of the work of completion of coaling plants.

Section of meteorology and hydrography.—Mr. F. D. Willson, chief hydrographer, continued in charge of this section.

Section of office engineer.—Mr. C. J. Embree, office engineer, continued in charge of this section.

Section of surveys.—Mr. O. E. Malsbury, assistant engineer, continued in charge of this section.

LOCK OPERATION AND MAINTENANCE.

LOCKAGES.

The following table gives the total commercial and noncommercial lockages of the year:

Date.	All lock-ages.	Commer- cial lockages.	Commer- cial vessels.	Noncom- mercial lockages.
Gatun:				
To July 1, 1916.....	2,254	1,779	1,980	475
During fiscal year.....	1,901	1,741	1,909	160
To July 1, 1917.....	4,155	3,520	3,889	635
Pedro Miguel:				
To July 1, 1916.....	2,317	1,825	1,925	492
During fiscal year.....	2,068	1,797	1,938	271
To July 1, 1917.....	4,385	3,622	3,863	763
Miraflores:				
To July 1, 1916.....	2,277	1,842	1,926	435
During fiscal year.....	2,025	1,792	1,930	233
To July 1, 1917.....	4,302	3,634	3,856	668

WATER CONSUMPTION, GATUN LAKE.

Complete data as to Gatun Lake hydrography are given herein-after, but for your information the following data have been compiled for the past fiscal year.

Average quantity per month.	Millions of cubic feet of water.	Per cent loss.	Per cent of total.
Lost:			
By evaporation.....	1,891.49	13.535	10.306+
By wastage over Gatun spillway.....	11,385.27	81.47	62.039+
By leakage at Gatun spillway.....	10.14	.072	.055+
By transfer to Miraflores Lake.....	34.13	.244	.185+
By leakage at all locks.....	28.68	.205	.156+
By drawing from storage.....	625.00	4.472	3.405+
Total water lost.....	13,974.71	99.998	
Used:			
For pumping.....	76.86	1.756	.418+
For lockages, Atlantic.....	674.78	15.416	3.6769+
For lockages, Pacific.....	544.45	12.439	2.966+
For hydroelectric station.....	3,080.86	70.388	16.787+
Total useful water.....	4,376.95	99.999	99.9939

Million
cubic feet.

Total average monthly amount of water available through rainfall..... 17,726.66

Total average amount drawn from storage..... 625.00

Total average amount used or lost..... 18,351.66

Useful water, 4,376.95÷18,351.66=23.83 per cent.

Percentage of water used for lockages=6.88 per cent.

During the exceptionally dry season of last winter the lake was drawn from plus 86.70 feet on January 2 to a low point of plus 83.14 on April 27. During this period there were used for power development 12,910.57 million cubic feet of water, an amount which is not greatly below the storage capacity of the lake between these two levels. In other words, if the hydroelectric station had been withdrawn from service throughout the dry season, and if no spilling had been enforced, Gatun Lake would have passed through the dry season with a loss of level of only 0.7 foot, although supplying water for an average of 166 through lockages per month.

The new hydroelectric station when developed to its ultimate capacity will call for about 150 per cent more water than the existing station, a monthly consumption of about 7,700 million cubic feet, as against 3,080 million cubic feet at present. A study has been made as to the effect this enlargement of the station will have on the lake storage in an exceptionally dry season, and the following results may be briefly stated:

Between the levels of +87 (which may be regarded as the practicable maximum at which the lake may be held during the month preceding the dry season drop in elevation) and +80 (42.67 feet over upper miter sills and 40 feet draft through the lake channels) there is storage capacity for 31,890 million cubic feet of water. Assuming inflow and all losses, except those for lockage and power, the same as during the last dry season, the study shows that without any use of water for power, the lake would have provided sufficient water for an average of 40 through lockages per day.

There is no doubt as to the ability of the lake to enter on the dry season at its maximum level, even with this increased use of water for power purposes, throughout the wet season, and with an increased use of water for lockage up to the capacity of the canal for traffic. The increase in the water consumption by the hydroelectric station will simply utilize some portion of the water supply which would otherwise be wasted over Gatun spillway, and the plant may be operated at full capacity during at least eight months of the year, and at partial capacity during the dry season, depending upon the amount of traffic passing through the canal. During successive dry seasons it will be necessary to closely observe the growth in traffic and the accompanying increase in demand for water for lockage purposes. As the locks demand an increasing amount of water, the power output of the hydroelectric station may be decreased, supplying the deficiency in power from the steam station at Miraflores.

This arrangement of using Miraflores steam plant as a reserve for power is preferable to any plan involving an additional hydroelectric-power site, as its installation would involve a heavy expense and heavy maintenance charges on a long transmission line through the jungle, without eliminating the auxiliary steam plant, which is necessary at all times as an emergency reserve.

GATUN DAM.

Monthly surveys of Gatun dam disclosed the fact that a slight settlement had been taking place in the dam west of the locks. When work was started on the hydroelectric-station penstock excavation, it was decided to take advantage of the opportunity and use the earth

for bringing this section of the dam back to grade, and 15,000 cubic yards of earth were emplaced on the dam, to an average depth of about 2 feet 9 inches. The remainder of the earth and rock removed, 25,700 cubic yards, was dumped on the Mindi levee.

REGULATING VALVES.

The regulating valves were installed complete upon the following dates:

Locks.	Machines installed complete.	Valves installed complete.
Upper Pedro Miguel	December, 1916	December, 1916.
Lower Pedro Miguel	June 1, 1916	Apr. 1, 1916.
Upper Miraflores	May, 1917	May, 1917.
Lower Miraflores	December, 1916	December, 1916.

TURNOUTS.

Locks.	Dates of completion.
Gatun lower east level	Apr. 1, 1916.
Gatun middle east level	Do.
Gatun upper east level	Do.
Gatun lower west level	Do.
Gatun middle west level	Do.
Gatun upper west level	Do.
Pedro Miguel west level	May 1, 1916.
Pedro Miguel east level	Do.
Miraflores lower east level	June 1, 1916.
Miraflores upper east level	Aug. 1, 1916.
Miraflores lower west level	Oct. 1, 1916.
Miraflores upper west level	Nov. 1, 1916.

REPAIR PITS.

Miraflores	May 1, 1917.
Pedro Miguel	June 1, 1917.
Gatun	May 1, 1916.

FENDER TIMBERS.

Arrangements are being made to install new fender timbers at lower Miraflores locks. The upper wooden buffers are in fair condition, but the lower set which are immersed at high tide are rotting badly and have to be replaced.

TOWING LOCOMOTIVES.

During the year the mechanical division completed the construction of four towing locomotives for the locks, these machines being the same as those now in service except that the cabs have been increased in height to allow the operators a better view of the vessels being towed.

BACKFILL AND GRADING.

At Miraflores locks the filling on the lower level of the east bank and the slope between the lower and upper levels was completed during July, 1916. The grading of the lower west side backfill was completed in June, 1917.

At Pedro Miguel the east side backfill was completed in January, 1917, and the west side backfill in April, 1917.

DRAINS FOR BACKFILLS.

In order to provide more satisfactory drainage of surface water during heavy rains, a considerable amount of concrete drainage ditch was constructed, as follows: 1,800 feet on the east backfill at Pedro Miguel, in April, 1917; 750 feet on the east backfill at Miraflores, in April, 1917; and 2,000 feet on the west backfill at Miraflores in June, 1917.

SPARE PARTS.

During the year a committee was appointed to determine upon the proper mechanical and electrical spare parts to be held in stock for the locks, together with a determination of the maximum and minimum number of such spares which shall be carried on hand.

Arrangements have been made to take over the Corozal cement shed for use in storing the heavy spare parts for the lock machines, as well as spare gates and valves.

Thirty-nine United States requisitions were issued during the year, 24 of them having been filled to date, the material on the balance being in process of manufacture.

PAINTING LOCK GATES AND VALVES.

During the year all submerged valves, gates, fixed irons and steel work at Pedro Miguel lock were coated with Navy bituminous compound. The following is the report on the dates of completion of this work:

Pedro Miguel lock.—All the work at Pedro Miguel, with the exception of the work on the interior of the miter gates and on rising stem valves Nos. 334 and 335, was done by the lock forces. The work on the interior of the miter gates was done by the American Bitumastic Enamels Company at the time the construction work on the gates was completed, and they also touched up this work at the time we had the chambers unwatered for our work. The work on rising stem valves Nos. 334 and 335 was done by the contractor in March, 1916.

Navy Department bituminous solution and enamel were used in connection with our work on all parts except gate No. 51, on which Navy Department bituminous cement was used. Analyses of the solution, enamel, and cement follows:

SOLUTION.

For 1,000 pounds of solution:

Trinidad asphalt.....	pounds..	523
Petroleum spirits.....	gallons..	63

BITUMINOUS ENAMEL.

Paving asphalt.....	per cent..	19.20
Trinidad asphalt.....	do.....	35.15
Val-de-Travers asphalt.....	do.....	6.68
Rosin.....	do.....	0.92
Slacked lime.....	do.....	1.39
Portland cement.....	do.....	8.15
Petroleum spirits.....	do.....	28.52

BITUMINOUS CEMENT.

Paving asphalt.....	per cent.....	51.21
Trinidad asphalt.....	do.....	14.25
Val-de-Travers asphalt.....	do.....	14.25
Rosin.....	do.....	1.14
Slacked lime.....	do.....	1.99
Portland cement.....	do.....	17.16

The following shows the work in detail at Pedro Miguel:

Miter gate No.	Interior completed (by contractor).	Interior touched up (by contractor).	Upstream side completed.	Downstream side completed.	Bottom completed.
50.....	Mar. 31, 1913	May 7, 1917	May 12, 1917	Apr. 4, 1917	May 16, 1917
51.....	do.....	do.....	May 11, 1917	do.....	Do.
52.....	do.....	May 23, 1917	May 22, 1917	Jan. 31, 1917	May 26, 1917
53.....	Jan. 31, 1913	do.....	do.....	do.....	Do.
54.....	Aug. 1, 1913	Apr. 5, 1917	Mar. 26, 1917	Apr. 29, 1917	Apr. 2, 1917
55.....	do.....	Apr. 3, 1917	Mar. 27, 1917	Apr. 24, 1917	Apr. 3, 1917
56.....	Dec. 23, 1913	Jan. 31, 1917	Jan. 23, 1917	Feb. 14, 1917	Jan. 30, 1917
57.....	do.....	do.....	Jan. 17, 1917	do.....	Do.
58.....	Sept. 9, 1913	Apr. 16, 1917	Apr. 2, 1917	Apr. 25, 1917	Apr. 11, 1917
59.....	do.....	do.....	Mar. 29, 1917	do.....	Do.
60.....	Dec. 30, 1913	Feb. 3, 1917	Jan. 29, 1917	Feb. 19, 1917	Feb. 5, 1917
61.....	Jan. 31, 1917	Jan. 31, 1917	Jan. 20, 1917	do.....	Do.
62.....	Oct. 10, 1913	Apr. 13, 1917	Mar. 30, 1917	Mar. 25, 1917	Mar. 21, 1917
63.....	do.....	do.....	do.....	do.....	Apr. 21, 1917
64.....	Dec. 30, 1913	Feb. 6, 1917	Jan. 16, 1917	Feb. 19, 1917	Feb. 18, 1917
65.....	do.....	do.....	do.....	do.....	Feb. 8, 1917
66.....	Sept. 9, 1913	Apr. 11, 1917	Apr. 6, 1917	Mar. 24, 1917	Apr. 20, 1917
67.....	do.....	Apr. 18, 1917	do.....	do.....	Do.
68.....	Dec. 29, 1913	Feb. 7, 1917	Feb. 3, 1917	Feb. 17, 1917	Jan. 25, 1917
69.....	do.....	Feb. 3, 1917	Jan. 17, 1917	do.....	Do.
70.....	June 15, 1913	Apr. 9, 1917	Apr. 26, 1917	Mar. 30, 1917	Apr. 16, 1917
71.....	do.....	Apr. 12, 1917	do.....	do.....	Do.
72.....	do.....	Feb. 13, 1917	Feb. 19, 1917	Feb. 1, 1917	Jan. 26, 1917
73.....	do.....	Feb. 5, 1917	Jan. 18, 1917	Jan. 18, 1917	do.....

RISING STEM VALVES.

Valve No.	Valve completed.	Fixed irons completed.	Valve No.	Valve completed.	Fixed irons completed.
312.....	Apr. 24, 1917	Apr. 24, 1917	326.....	Apr. 7, 1917	Apr. 7, 1917
313.....	Apr. 17, 1917	Apr. 17, 1917	327.....	Apr. 17, 1917	Apr. 18, 1917
314.....	Apr. 19, 1917	Apr. 19, 1917	328.....	Apr. 7, 1917	Apr. 7, 1917
315.....	Apr. 23, 1917	Apr. 25, 1917	329.....	Apr. 13, 1917	Apr. 13, 1917
316.....	Feb. 13, 1917	Feb. 14, 1917	330.....	Jan. 26, 1917	Jan. 26, 1917
317.....	Feb. 10, 1917	Feb. 10, 1917	331.....	Feb. 15, 1917	Feb. 16, 1917
318.....	Feb. 3, 1917	Feb. 3, 1917	332.....	Apr. 12, 1917	Apr. 13, 1917
319.....	Jan. 27, 1917	Jan. 27, 1917	333.....	Apr. 21, 1917	Apr. 21, 1917
320.....	Apr. 13, 1917	Apr. 13, 1917	334.....	Mar. 22, 1916	Mar. 22, 1916
321.....	Apr. 18, 1917	Apr. 20, 1917	335.....	Mar. 7, 1916	Mar. 7, 1916
322.....	Feb. 13, 1917	Feb. 14, 1917	336.....	Jan. 26, 1917	Jan. 26, 1917
323.....	Feb. 10, 1917	Feb. 11, 1917	337.....	Feb. 2, 1917	Feb. 2, 1917

NONOPERATING VALVES.

Valve No.	Date completed.	Valve No.	Date completed.
324.....	Apr. 27, 1917	325.....	Feb. 18, 1917

CYLINDRICAL VALVES.

Valve No.	Date completed.	Valve No.	Date completed.
600.....	Apr. 17, 1917	610.....	Apr. 17, 1917
601.....	Jan. 29, 1917	611.....	Jan. 29, 1917
602.....	Apr. 16, 1917	612.....	Apr. 16, 1917
603.....	Feb. 13, 1917	613.....	Jan. 30, 1917
604.....	Apr. 17, 1917	614.....	Apr. 17, 1917
605.....	Jan. 29, 1917	615.....	Jan. 29, 1917
606.....	Apr. 17, 1917	616.....	Apr. 17, 1917
607.....	Jan. 30, 1917	617.....	Jan. 30, 1917
608.....	Apr. 16, 1917	618.....	Apr. 16, 1917
609.....	Jan. 30, 1917	619.....	Jan. 30, 1917

INTAKE SCREENS.

All screens completed.....	May 12, 1917
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BULKHEADS.

Bulkhead.	Date completed.	Bulkhead.	Date completed.
East chamber.....	April 28, 1917	West chamber.....	Feb. 18, 1917

Miraflores locks.—The work at Miraflores locks was done by the American Bitumastic Enamels Company, under contract, with a five-year guarantee. All the cleaning of the parts, however, with the exception of the cleaning of the miter gates, was done by the lock forces. The contractor used its own product, analysis of which follows, this being taken from data submitted by it:

Analysis of bitumastic enamel.

Softens at.....	°F.....	180
Flows at.....	°F.....	220
Loss at 100° C., light hydrocarbons.....	per cent.....	0.50
Volatile combustible matter.....	do.....	48.40
Fixed carbon.....	do.....	32.40
Ash, mineral matter.....	do.....	18.70
Total.....	do.....	100.00
Sulphur.....	do.....	0.94
Nitrogen.....	do.....	0.95

FRACTIONATED EXTRACTION.

Acetone soluble—petrolenes.....	per cent.....	44.80
Chloroform soluble—asphaltenes.....	do.....	21.50
Total bitumen.....	do.....	66.30
Nonbituminous organic matter.....	do.....	15.00
Inorganic mineral matter.....	do.....	18.70
Total.....	do.....	100.00

Analysis of bitumastic solution.

Hydrocarbons, volatile at 100° C.....	per cent.....	32.45
Hydrocarbons, volatile at over 100° C.....	do.....	50.49
Fixed carbon.....	do.....	17.02
Ash, chiefly iron oxide.....	do.....	0.04
Specific gravity at 25° C.....		1.1055

FRACTIONATED EXTRACTION.

Petrolenes, soluble in acetone-----	per cent--	86.00
Asphaltenes, soluble in chloroform-----	do-----	6.09
Organic matter-----	do-----	7.87
Mineral matter-----	do-----	0.04

Total-----do----- 100.00

The following shows the dates of completion on the various parts of the miter gates at Miraflores locks:

Miter gate No.	Interior completed.	Interior cued up.	Downstream side completed.	Upstream side completed.	Bottom completed.
100.....	July 31, 1913	Jan. 9, 1917	Jan. 9, 1917	Mar. 8, 1916	Jan. 9, 1917
101.....	do	do	do	do	Do.
102.....	do	Dec. 27, 1916	Dec. 30, 1916	June 23, 1916	Dec. 30, 1916
103.....	do	do	do	do	Do.
104.....	Dec. 6, 1913	Mar. 21, 1916	Mar. 2, 1916	Mar. 3, 1916	Mar. 4, 1916
105.....	Dec. 12, 1913	do	do	do	Do.
106.....	Oct. 15, 1913	July 17, 1916	July 17, 1916	July 17, 1916	July 17, 1916
107.....	Sept. 29, 1913	do	do	do	Do.
108.....	Dec. 30, 1913	Apr. 6, 1916	Mar. 7, 1916	Mar. 7, 1916	Mar. 7, 1916
109.....	do	do	do	do	Do.
110.....	Nov. 8, 1913	Aug. 4, 1916	July 17, 1916	July 17, 1916	July 17, 1916
111.....	Oct. 24, 1914	do	do	do	Do.
112.....	Dec. 4, 1913	Apr. 12, 1916	Mar. 14, 1916	Mar. 14, 1916	Mar. 14, 1916
113.....	do	Apr. 13, 1916	do	do	Do.
114.....	Aug. 7, 1913	Aug. 4, 1916	July 18, 1916	July 18, 1916	July 18, 1916
115.....	Sept. 30, 1913	June 24, 1916	do	do	Do.
116.....	Jan. 2, 1914	June 25, 1916	Mar. 14, 1916	Mar. 14, 1916	Mar. 14, 1916
117.....	do	June 23, 1916	do	do	Do.
118.....	Nov. 5, 1913	Aug. 4, 1916	July 19, 1916	July 19, 1916	July 19, 1916
119.....	do	June 24, 1916	do	do	Do.
120.....	Jan. 16, 1914	May 10, 1916	May 20, 1916	May 20, 1916	May 20, 1916
121.....	Jan. 12, 1914	do	do	do	May 10, 1916
122.....	Nov. 7, 1913	Nov. 29, 1916	Nov. 29, 1916	Nov. 29, 1916	Nov. 29, 1916
123.....	do	do	do	do	Do.
124.....	Nov. 1, 1913	May 20, 1916	May 20, 1916	May 20, 1916	May 20, 1916
125.....	Sept. 24, 1913	do	do	do	Do.
126.....	Sept. 30, 1913	Nov. 29, 1916	Nov. 29, 1916	Nov. 29, 1916	Nov. 29, 1916
127.....	do	do	do	do	Do.

RISING STEM VALVES.

Valve No.	Valve completed.	Fixed irons completed.	Valve No.	Valve completed.	Fixed irons completed.
412.....	Aug. 18, 1916	Aug. 18, 1916	432.....	Apr. 4, 1916	Mar. 28, 1916
413.....	Aug. 19, 1916	Aug. 19, 1916	433.....	Apr. 1, 1916	Apr. 11, 1916
414.....	Mar. 25, 1916	Mar. 25, 1916	434.....	May 25, 1916	May 26, 1916
415.....	Mar. 30, 1916	Mar. 30, 1916	435.....	May 29, 1916	May 29, 1916
416.....	Mar. 23, 1916	Mar. 23, 1916	436.....	Aug. 1, 1916	Aug. 9, 1916
417.....	Mar. 30, 1916	Mar. 30, 1916	437 ^a	Feb. 24, 1915	Aug. 10, 1916
418.....	Aug. 10, 1916	Aug. 17, 1916	438.....	June 3, 1916	June 3, 1916
419.....	do	Aug. 12, 1916	439.....	May 26, 1916	May 26, 1916
420.....	Apr. 10, 1916	Apr. 10, 1916	440 ^a	Feb. 27, 1915	May 19, 1916
421.....	Mar. 17, 1916	Mar. 17, 1916	441 ^a	do	May 10, 1916
422.....	July 29, 1916	Aug. 5, 1916	442 ^a	Feb. 13, 1915	Nov. 21, 1916
423.....	July 28, 1916	Aug. 1, 1916	443.....	Feb. 12, 1915	Nov. 28, 1916
426.....	Mar. 30, 1916	Mar. 28, 1916	444.....	June 13, 1916	June 17, 1916
427.....	Apr. 10, 1916	Apr. 10, 1916	445.....	June 7, 1916	June 7, 1916
428.....	Mar. 29, 1916	Mar. 14, 1916	446.....	Mar. 9, 1916	Mar. 9, 1916
429.....	Apr. 4, 1916	Apr. 5, 1916	447.....	Mar. 30, 1916	Mar. 21, 1916
430 ¹	Mar. 2, 1915	Aug. 5, 1916	448 ^a	Feb. 17, 1915	Nov. 22, 1916
431 ²	Feb. 25, 1915	July 29, 1916	449 ³	Feb. 18, 1915	Nov. 28, 1916

¹ Touched up July 27, 1916.² Touched up July 25, 1916.³ Touched up Aug. 1, 1916.⁴ Touched up May 19, 1916.^a Touched up May 10, 1916.^b Touched up Nov. 22, 1916.^c Touched up Nov. 27, 1916.

NONOPERATING VALVES.

Valve No.	Date completed.	Valve No.	Date completed.
424.....	Apr. 16, 1916	425.....	Aug. 12, 1916

CYLINDRICAL VALVES.

Valve No.	Date completed.	Valve No.	Date completed.
700.....	Mar. 24, 1916	720.....	May 10, 1916
701.....	July 22, 1916	721.....	Nov. 25, 1916
702.....	Mar. 24, 1916	722.....	May 10, 1916
703.....	July 22, 1916	723.....	Nov. 25, 1916
704.....	Mar. 24, 1916	724.....	May 10, 1916
705.....	July 22, 1916	725.....	Nov. 25, 1916
706.....	Mar. 24, 1916	726.....	May 10, 1916
707.....	July 22, 1916	727.....	Nov. 25, 1916
708.....	Mar. 24, 1916	728.....	May 10, 1916
709.....	July 22, 1916	729.....	Nov. 25, 1916
710.....	Mar. 23, 1916	730.....	May 10, 1916
711.....	July 22, 1916	731.....	Nov. 25, 1916
712.....	Mar. 23, 1916	732.....	May 10, 1916
713.....	July 22, 1916	733.....	Nov. 25, 1916
714.....	Mar. 23, 1916	734.....	May 10, 1916
715.....	July 22, 1916	735.....	Nov. 25, 1916
716.....	Mar. 23, 1916	736.....	May 10, 1916
717.....	July 22, 1916	737.....	Nov. 27, 1916
718.....	Mar. 23, 1916	738.....	May 10, 1916
719.....	July 22, 1916	739.....	Nov. 25, 1916

INTAKE SCREENS.

All screens completed.....	April 6, 1916
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BULKHEADS

Bulkhead.	Date completed.	Bulkhead.	Date completed.
Upper level east side.....	Mar. 24, 1916	Upper level, west side.....	July 22, 1916
Lower level east side.....	June 15, 1916	Lower level, west side.....	Nov. 25, 1916

LOCKS DIVISION OPERATING FORCE.

Month.	Gold force.				Silver force.			
	Mira-flores locks.	Pedro Miguel lock.	Gatun locks.	Total gold force.	Mira-flores locks.	Pedro Miguel lock.	Gatun locks.	Total silver force
July.....	50	28	50	128	272	174	268	714
August.....	49	29	59	137	213	169	203	585
September.....	45	34	58	137	207	156	242	605
October.....	46	33	56	135	223	155	207	585
November.....	47	30	57	134	229	162	206	597
December.....	45	31	59	135	229	166	215	610
January.....	37	47	60	144	198	280	281	759
February.....	39	46	60	145	208	257	279	744
March.....	41	43	59	143	229	297	237	763
April.....	38	51	58	147	213	279	247	739
May.....	44	39	60	143	231	180	218	629
June.....	45	33	59	137	273	211	212	696
Average.....	43.8	37	57.9	138.7	227	207	234.6	668.8

Following are extracts from reports of the lock superintendents covering further details of operation and maintenance of the locks:

GATUN LOCKS.

Capt. T. H. Dillon, United States Army, as superintendent, continued in charge of the work until March 5, 1917, when he was transferred to other duties. Capt. E. J. Atkisson, United States Army, assistant superintendent, and Mr. E. D. Stillwell, electrical supervisor, were appointed superintendent and assistant superintendent, respectively, on that date. Mr. C. W. Roberts was promoted to the position of electrical supervisor. On April 15, 1917, Capt. Atkisson was relieved from duty with The Panama Canal, and Mr. E. D. Stillwell was appointed superintendent. The position of assistant superintendent was filled by the appointment of Mr. H. M. Thomas on May 1, 1917. Mr. T. E. Heslin continued as mechanical supervisor until his resignation, which became effective June 12, 1917. This position was not filled at the end of the year. The remainder of the organization continued in effect as in the preceding year, except for an increase in the number of locomotive operators. The personnel of our organization has changed very rapidly during the year, due to transfers and resignations, and as a result we have had to train a large number of men for the position of locomotive operator. The same system of training the new operators by one man has continued in effect with very good results.

OPERATION.

One chamber at a time has been out of service for a considerable period, due to painting of gates and inspection of valves and culverts, so that saving of water by cross filling has not been done to any extent. It has also been the practice to use only one chamber for lockages at a time, so that a change in the direction of lockages wastes considerable water.

The same system of operation in effect the past year was continued with only minor changes in order to obtain safer operation. There have been no serious delays or accidents to ships while passing through the locks.

The largest ship locked through to date was the steamship *Minnesota*, north-bound, on February 27, 1917. The length of this ship is 622 feet, beam 73 feet, and a fresh-water draft of 26 feet 3 inches forward and 28 feet aft. She was handled without difficulty by six locomotives. The time of the lockage was 1 hour and 14 minutes, a single culvert being used, except in the lower lock.

In general, with a number of ships bound in the same direction and following in close order, tandem, or follow-up, lockages are made depending on the size of ships. Tandem lockages are usually made when ships are waiting at the approach walls when the combined length of the two ships does not exceed 720 feet, with the larger of the two less than 450 feet. In case the over-all length of the two ships is greater than 720 feet follow-up lockages are made, using four locomotives on each ship if they are under 450 feet in length.

In general, with ships 360 feet or under in length, four locomotives are used. On ships over 360 feet in length six locomotives are used. When follow-up or tandem lockages are to be made four locomotives may be used on ships up to 450 feet in length. On ships over 450 feet in length six locomotives are used.

The above rules apply to normal ships. In individual cases the lock pilots are authorized to call for more locomotives, and therefore cut out tandem lockages when, in their judgment, conditions for safe operation require it. At present we are limited in making tandem and follow-up lockages by having only four locomotives available on each side wall.

OPERATING MACHINERY.

A complete set of instructions has been issued covering the maintenance on all the different lock-operating machines, so that in certain periods of the year all machines are thoroughly overhauled, if necessary, in addition to the regular inspection, lubrication, and general maintenance. In this way no important work on any machine is overlooked.

Only minor changes have been made on any machine, and these were made for the purpose of better lubrication of certain parts of machines and to facilitate inspection.

One of the most important changes made has been the installation of grease cups on the top and bottom disks on the locomotives in order to lubri-

ate the friction disk. This has resulted in great improvement and more reliability in the friction disk, which is adjusted to slip at 25,000 pounds. The friction on being tested rarely shows a variation of more than 2,000 pounds from the normal, and this has practically done away with the breaking of locomotive cables during lockages.

A summary of the most important work on the various machines is as follows:

Locomotives.—Manufactured and installed new coiling and control fuse boxes on all locomotives. The original fuse boxes installed were badly warped and broken. Installed spring-locking devices on traction clutch levers on all machines. Cut inspection sliding doors back of switch panels, both cabs, all locomotives. Extended rack sections at head of steep inclines on the return tracks, upper level, all walls, and center wall, middle and lower levels. This was done on account of two serious accidents to locomotives due to the operators not running far enough away from the inclines on the rack section before shifting the traction clutches after ascending the incline. Both towing track sections at the break in the south approach wall were realigned and lowered.

Emergency dams.—Installed hinges on all girder panel cabinets. Installed signal arrows, throw-out hooks for No. 1 gates, and guides for cables on gates. Installed cut-out switches on No. 1 girder, both dams, in order to prevent possible jamming of girder while raising. The emergency dams have been operated once each month, excepting the time when each dam was painted. The average time of operation is about 30 minutes. Congo roofing was placed on both operators' houses and switch houses. Formerly water leaked in through the concrete onto the switchboards and panels.

Miscellaneous.—A double-pole circuit breaker with a shunt trip was installed in place of the main three-pole switch on the contactor panel on rising stem valve No. 246. The purpose of this installation is to provide a positive opening of the main line circuit in case of the limit switch failing for any reason at the end of the stroke, or the contactors sticking in, thus allowing the valve to over-travel and damage the machine and possibly the motor. The shunt trip circuit of the breaker is completed by an arm attached to the crosshead making contact with a small spring switch attached to the wall at the ends of the stroke of the valve. This arrangement has worked very satisfactorily, except that the circuit breaker occasionally opens the circuit due to the vibration of the machine and the jar caused by the opening and closing of the contactors. This has been practically remedied by the placing of felt and rubber washers on the studs holding the circuit breaker to the panel.

Auxiliary carbon contacts used in connection with the copper contacts on panel contactors on one chain fender, emergency dam, and locomotive, have shown that the maintenance can be reduced about 75 per cent if all main contactors were equipped in this manner. It will also minimize the possibility of the contactors freezing.

A change has also been made in the exterior lighting circuit breakers in the transformer rooms. These are provided with auxiliary carbon contacts. The back carbon holder was so rigid that the blow caused by closing the switch would, in a short time, break the carbons, causing frequent renewals. This has been practically done away with by changing the back carbon holder so that it makes a 180° bend and allows more spring.

A new dock was built at the northeast wing wall to provide a suitable landing for launches and other equipment.

Three new toilets were built; one near the arches at the north end of the locks on the east and west walls, and the other under the east emergency dam.

Concrete ventilators were placed over all transformer rooms. This has resulted in a lower temperature and better air circulation.

The glasses in the deck-light slabs over the tunnels and machine rooms have been replaced in practically all places, except those over the bull wheels of the miter gate machines.

A small motor-driven air compressor, operated from the control house, was installed for blowing the lockage whistle.

The old French barge, No. 189, was overhauled and painted, new wooden floors placed in the bottom, and bits installed. This barge is used for transferring heavy material from one side of the locks to the other.

Pump barge No. 169, with its equipment, has been placed in good operating condition. This barge was used for pumping out the middle levels, east and west chambers, to allow the contractor to touch up the gates below sea level.

Painting and inspection of valves, culverts, etc.—Painting of the lock machines and equipment was continued throughout the year as was necessary.

A suitable oil paint for the lock gates which are alternately exposed to the water and air has not been found, and this has necessitated frequent painting and retouching of the surfaces.

Four gates were divided into sections and different kinds and mixtures of paint applied to each section. The most satisfactory was found to be the standard red-lead mixture, composed of 28 pounds red lead, two-thirds gallon raw linseed oil, and one-third gallon boiled linseed oil. This paint has a glossy surface to which foreign matter does not readily adhere.

The upstream side of gate No. 25 was painted with bitumastic solution and enamel to the full height of the gate in September, 1916. At the same time the upstream side of gate No. 26 was painted with the Navy solution and enamel. The bitumastic on gate No. 25 (manufactured by the American Bitumastic Enamels Company) is in excellent condition, while the Navy paint on gate No. 26 has sagged, leaving the metal bare in a number of places where it has been exposed to the sun and air.

The lock forces have painted or touched up the paint on all the gates in the middle and upper levels in both chambers. At the same time, the American Bitumastic Enamels Company has retouched the surfaces where their products had been improperly applied. The work was extensive.

While the upper and middle levels were unwatered, inspections were made of the valves and culverts. Several floor plates around the valves had become loose and were lost and a total number of seven were replaced.

The babbitt seats on valves Nos. 249 and 233 were replaced by one of greenheart and lignum-vitæ, respectively. The side seal points on valve No. 233 were replaced by lignum-vitæ strips.

A "Gravitas" machine for applying a protective coating of zinc on steel and other metals by the Schoop process was leased for one year from the Metals Coating Company. In February, 1917, rising stem valve No. 233 with the roller trains, valve stem, roller-train rods, guide bearing, all bolts and nuts, were thoroughly cleaned, sandblasted, and a coating of zinc applied with the above machine. A section of the downstream side of gate No. 14 below sea level was also sandblasted and coated with zinc. Since the zinc was applied the chamber has not been unwatered so that it is not known at this time whether the zinc will give the desired protection to the steel parts. The success of the process depends to a great extent on the cleaning and roughing up of the surface by sandblasting. In the case of a valve with the numerous small parts, this is a slow and tedious process, and it is doubtful whether it would be feasible to apply the zinc to all underwater metallic surfaces.

It had been expected to complete the unwatering of both chambers and overhaul all valves and paint the gates by the close of this fiscal year; but on account of being unable to secure the lock caisson until the start of the rainy season, the work has been postponed until the next dry season.

The work to be done by the American Bitumastic Enamels Company under their five-year guarantee in the lower lock in each chamber will be practically the enameling of the entire surface of the gates below sea level as the barnacles have gone through the paint to the metal to such an extent as to destroy the covering in most places, allowing rust to form. The work on the gates already done by the contractor in the upper and middle levels, while not completed, has amounted to the application of about one-third of the material originally applied. This has been caused not by the failure of the material itself, but to improper application. This was due, to a great extent, undoubtedly to the fact that the painting was done entirely during the rainy season and the material was applied to the damp surfaces so that the bitumastic did not properly adhere to the metal.

PACIFIC LOCKS.

Mr. R. H. Whitehead, superintendent, resigned on August 15 and Mr. Wm. R. Holloway, assistant superintendent, was appointed superintendent in his stead. Mr. J. C. Myrick was appointed electrical supervisor of the Pacific locks on July 15, 1916, and was promoted to assistant superintendent on August 26, 1916. Mr. R. S. Mills was promoted from senior control house operator to electrical supervisor on September 1, 1916. Mr. George L. Viberg continued as mechanical supervisor of these locks.

The general organization remained the same as for the previous fiscal year. The headquarters of the superintendent are located at Pedro Miguel lock, and

those of the assistant superintendent at Miraflores locks. The electrical and mechanical supervisors divide their time between the two sets of locks as their supervision is required. The operators are transferred back and forth between the two sets of locks as their services are required.

OPERATION.

Two-shift operation was maintained throughout the year, these shifts overlapping and covering a day from 7 a. m. to 6 p. m. at Pedro Miguel, and from 7 a. m. to 8.30 p. m. at Miraflores. These hours take care of the traffic under normal operating conditions. Operations are made Sundays and holidays the same as week days, and the men are given relief days to cover this work and overtime, although very little overtime is required.

Delays due to failure of machinery have been of negligible magnitude. There was but one delay due to errors in operation of the lock machinery, this occurring on June 25 when the upper gates in the west chamber at Miraflores locks were closed on the steamship *Svainby* while she was entering the chamber. Damage to vessels in locking has been slight, the most frequent damage being broken chocks, this being caused in practically every instance by the chocks not being sufficiently strong to take the strain of the tow line.

The average time of making a lockage at Pedro Miguel is 22.2 minutes and at Miraflores 36.7 minutes. This covers the period from the time the ship passes the first chain fender until it has cleared the gates.

Drill operations of the emergency dams were made throughout the year, but no emergency operations were necessary. There was no opportunity during the year for the chain fenders to be given an emergency test.

MAINTENANCE.

The necessary mechanical and electrical repairs and painting work were carried out to maintain the machinery and equipment in good condition, and the usual amount of grass cutting was carried on in connection with the maintenance of the backfill and the spaces in the lock walls.

Transformer rooms.—The oil in the transformers and oil switches was tested, and as a result all this oil at Pedro Miguel lock has been filtered and preparations have been made to carry out this same work at Miraflores locks. All transformer room relays were tested and reset.

Conductor slot.—The concrete in the conductor slot at that portion of the slot over the operating tunnels was coated with bitumen solution and enamel to prevent water from leaking through into the wire chases or into the transformer-rooms.

Floating caisson.—The floating caisson was at Balboa shops at the close of the fiscal year 1916 undergoing repairs by the mechanical division. This work was completed and the caisson put in operation at Miraflores locks in November, 1916.

Spillway caisson.—That portion of the spillway caisson below the water line was coated with bitumastic solution and enamel by the American Bitumastic Enamels Company under contract, this work being completed in July, 1916. The bitumastic was applied for a distance of 18 feet from the bottom.

Fenders.—A carload of timbers for fenders was received and work was started at Miraflores replacing defective timbers on the approach and wing walls. It will be necessary to replace practically all these timbers at both sets of locks during the next fiscal year. Similar renewals on the crib fenders will have to be made, but no material has been received as yet for this work.

Deck lights.—Glasses for the deck lights were replaced where necessary.

Application of bitumastic.—The work of applying bitumastic solution and enamel to the valves, the submerged portions of the lock gates, etc., at Miraflores was completed by the contractor (the American Bitumastic Enamels Company) on January 9, 1917. The floating caisson was towed to Pedro Miguel lock on January 10, 1917, and installed at the lower end of the west lock. Work was then started by the lock forces applying bitumen solution and enamel to the valves, submerged parts of the miter gates and other submerged portions of lock equipment. It was the original intention to have this work done by contract, but the contractor's price was considered excessive and it was estimated that a considerable saving could be effected by the lock forces doing the work. At Pedro Miguel the work was completed on May 26. The following figures show a comparison of the cost as covered in the proposal of the con-

tractor and the actual cost of the work as performed by the lock forces. Miter gates: The contractor's proposal covered a price of \$0.13 per square foot for this work, the cleaning to be done by him. The unit cost of this work as performed by the lock forces was \$0.042 per square foot. Rising stem valves: The contractor's price was \$77 per valve, covering the coating of the valve, the removable parts and the fixed irons, the cleaning to be done by the lock forces. The total cost of doing this work by the lock forces was \$88.15 per valve, the unit cost of cleaning amounting to \$33.47, the price to compare with the contractor's figures being \$54.68 per valve. Cylindrical valves: The contractor's unit price for doing this work was \$25, the cleaning to be done by the lock forces. The cost of the work as performed by the lock forces amounted to \$23.45 per valve, the cleaning amounting to \$4.33 per valve. The cost of this work as compared with the contractor's price was \$19.12. Intake screens: The contractor quoted a price of \$50 per screen, the cleaning to be done by the lock forces. The total cost of doing this work by the lock forces was \$76.31 per screen, the cleaning amounting to \$30.55 per screen, the price to compare with the contractor's figure being \$45.76. Nonoperating valves and center wall culvert bulkheads: The contractor's unit price for this work was \$30 for the nonoperating valves and \$20 for the center wall culvert bulkheads. The unit cost of doing this work by the lock forces was \$23.46, the cleaning amounting to \$5.31. The cost to compare with the contractor's figure is \$18.15. A comparative statement of the costs follows:

	Cost of work if done by the contractor.	Cost of work as done by lock forces.
Miter gates (172,200 square feet).....	\$22,386.00	\$7,133.29
Rising stem valves (22).....	1,694.00	1,202.96
Cylindrical valves (20).....	500.00	382.40
Intake screens (12).....	600.00	544.12
Nonoperating valves and center wall culvert bulkheads (2 of each).....	100.00	72.60
Total.....	25,280.00	9,340.37

It is estimated, therefore, that a saving of over \$15,000 was effected by the lock forces doing this work. There were other expenses, of course, in connection with this work not included in the comparison, such as cost of electric current, labor on operation of the floating caisson and pumps, diving, etc., which expenses to The Panama Canal would have remained the same had the work been done by the contractor. The Navy Department bituminous solution and enamel were used on all this work except gate No. 51, on which gate their bituminous solution and cement were used, being applied to the upstream and downstream sides and bottom girder for test purposes.

Rising stem valves.—Twenty-two rising stem valves at Pedro Miguel lock were given a general overhauling at the time the chambers were unwatered for the work of applying the bituminous solution and enamel to the submerged parts. The other two valves had been overhauled previously.

CONSTRUCTION.

Repair pits.—The work on the construction of the repair pits at Pedro Miguel was completed in May, 1917, and at Miraflores in April, 1917. Two pits were constructed at Pedro Miguel, one for the east side and one for the west side; and four pits were constructed at Miraflores, two for each side for the two levels.

Mess building.—The work on the mess buildings was completed in July, 1916, by the forces of the building division. These buildings provide places for the gold and silver men to eat their lunches; and rooms were also set aside to store cement and for paint shop.

Rising stem valves.—The work of installing the oiling devices on the rising stem valves was completed during the year. These devices were installed for oiling the roller trains and the submerged portions of the valves.

Railroad track.—The old construction track on the backfills was gone over and put in shape for permanent operations. This work consisted mainly in lining up the track and raising or lowering to conform with the level of the

backfill. This work at Pedro Miguel was completed in July, 1916, and at Miraflores in May, 1917.

Turnouts.—During the year the turnouts for Miraflores locks were completed, those for Pedro Miguel lock having been completed during the previous fiscal year.

Towing locomotives.—Two new towing locomotives were received in June, 1917, from the mechanical division, which division performed the mechanical work on them; the electrical work is being done by the lock forces.

Backfill.—The grading of the west backfill at Pedro Miguel lock was completed in April, 1917, approximately 15,500 cubic yards of material having been removed, at an approximate cost of \$7,000.

ELECTRICAL DIVISION.

The duties of the electrical division have continued the same as last year.

The power plants, substations, transmission and distribution systems have operated satisfactorily without incident worthy of special mention.

New 4,400-horsepower water wheels were installed at the Gatun hydroelectric station in units 1, 2, and 3, which has increased their capacity about 40 per cent, making a total for the station of 8,640 k. w. at 80 per cent power factor. Money is available, material has been ordered, and construction is under way for the installation of three additional penstocks and one additional unit (No. 4) of 4,500 k. w., which was as large as could be installed without radical changes in building layout. The operating voltage will be changed to 6,600 volts. Provision is being made for the addition of units Nos. 5 and 6 whenever they are required. The capacity of the hydroelectric station, when present changes are completed, will be 13,140 k. w., and this has necessitated corresponding changes in transformers, etc. The ultimate capacity of the hydroelectric station as now contemplated will be 22,140 k. w., which is about double our present load and about 50 per cent over-all load immediately in prospect.

Our estimates indicate that there will be sufficient water over and above that necessary for the maximum capacity of locks and for other necessary purposes to provide for this power except during an abnormally dry season, during which time it is expected to carry the load at Miraflores steam plant.

The Miraflores steam plant now consists of six steam-driven turbogenerators, each of 1,200 k. w. capacity at 80 per cent power factor. It is expected to operate this plant as a reserve for the hydroelectric station in case of accident or whenever necessary to save water. As far as can be foreseen at present, it will be more economical to maintain our reserve at this plant rather than by new hydro projects elsewhere. It will be necessary to increase the capacity of the steam plant, and estimates are now being prepared to do this work in the fiscal year 1919.

The average production cost of current for power, exclusive of depreciation at 3 per cent, was \$0.005106 per k. w. h., and including depreciation charges was \$0.007301 per k. w. h. The average cost of current for lighting, which includes maintenance of house and building lighting systems and lamp renewals, was \$0.01338 per k. w. h.

There were 38 cases of power interruptions and 27 insulator failures, as against 33 and 27, respectively, for the previous year. Plans are under way and funds are available for the installation of a fourth disk on insulators and for installation of reverse current relays for operation of transmission lines in parallel during the coming year.

About 185,000 feet of underground cable were laid, and complete lighting systems were installed in 86 Army buildings, 45 Panama Railroad buildings, and 991 apartments for canal employees.

On the railway signal system there was only one reported false clear aspect, and considerable improvement has been made in lessened signal interruption and train delays compared with previous years.

There were 2,154 telephones in service on June 30, 1917, as against 1,878 on June 30, 1916. The average number of cases of telephone trouble per day has been reduced from 13 to 8. New storage batteries were installed at Colon, Pedro Miguel, and Balboa exchanges. Plans are under way to take care of increase in telephone business by building a new exchange at Cristobal and installing additional cable for trans-isthmian service.

The fire-alarm system has been incorporated in the telephone department.

The details of the operations of the electrical division during the fiscal year are covered in the report of the electrical engineer, which follows:

ELECTRICAL DIVISION.

Maj. T. H. Dillon, United States Army, Electrical Engineer.

The duties of the electrical division during the fiscal year comprised the necessary work of design, construction, operation, and maintenance of the steam and hydroelectric power plants, substations, transmission lines, and power-distribution systems; municipal, street, dock, building, and house lighting systems; the telephone, telegraph, fire-alarm, and railway block signal systems and interlocking plants; the electric cargo-handling cranes; electric-truck storage-battery systems; and the installation and repair of all classes of electrical apparatus for The Panama Canal, Panama Railroad Co., Army, and Navy, and of all departments and divisions therein.

ORGANIZATION AND PERSONNEL.

Maj. W. H. Rose was electrical engineer until June 1, 1917, upon which date he was relieved by Maj. T. H. Dillon. On November 29, 1916, the work was divided into five principal divisions, as follows: Office and requisitions, Carl W. Markham; power and transmission system, W. L. Hersh, superintendent; construction and maintenance, W. L. Fey, superintendent; telephones and telegraph, C. L. Bleakley, superintendent; railway signal system, E. C. McDonald, supervisor.

On June 30, 1917, there were 198 gold and 483 silver employees on our rolls. Our average monthly expenditures are about \$85,000, of which \$72,000 consists of work done for other departments and divisions.

OFFICE AND DESIGN.

The usual miscellaneous office work was done throughout the year, including correspondence, requisitions, reports, etc.

Plans were developed and specifications prepared for the extensions to the hydro plant for more than doubling its capacity; for necessary changes to our power and transmission systems resulting therefrom; for necessary extension to underground conduit and cable distribution systems for light, power, and telephone systems in permanent towns and Army and Navy reservations, and for all new buildings of The Panama Canal, etc.

This division has been assisted in large measures in design and specification by the office engineer, Mr. C. J. Embree, and the draftsmen under his charge, to all of whom great credit is due.

REPORT ON ELECTRICAL POWER.

Electrical power was furnished for the construction of the canal by steam plants at Gatun, Empire, and Miraflores. The hydroelectric plant at Gatun was designed to replace these plants for furnishing continuous power upon the completion of canal construction work. The original installation at the hydro consisted of three 2,000 k. w. generators at 80 per cent power factor.

The Miraflores steam plant was continued in service as a reserve plant, and to it were transferred the units from the Gatun steam station. The Miraflores steam plant now consists of six steam-driven turbines direct connected to 1,200 k. w. generators working at 80 per cent power factor and tied into the high-tension transmission line through the Miraflores substation. Sufficient power is held in reserve to supply Pacific locks in case of failure of service elsewhere, and two boilers are kept under pressure for ready service.

Due to the steady growth of the electrical load on the Isthmus, as discussed in previous reports, the original capacity of the hydro station was insufficient, and peak loads were carried at Miraflores steam plant. New water wheels were installed at Gatun, as discussed in report of 1915 and 1916, which has increased the capacity of each of the three generators to 2,880 k. w. at 80 per cent power factor, an increase in power of approximately 40 per cent. This work was completed December 19, 1916, at a total cost of \$16,377.91. This includes credit for bronze runners removed and sold as scrap.

The next step contemplated the extension of the building and the installation of three more units. This work is now under way. Only one new unit is being installed at the present time. In connection with this extension it was decided to raise the voltage of the three original units at the station by autotransformers and make the operating voltage 6,600 on account of saving thus accomplished in cost of necessary cables from hydro to Gatun substation. The new unit was designed for the greatest capacity that could be gotten into the building without radical changes. It consists of a General Electric Company 6,600-volt, 3-phase, 25-cycle, 4,500 k. w. (at 80 per cent power factor) generator mounted on vertical shaft connected to 6,750 h. p. turbine furnished by the Pelton Water-wheel Company.

Provision had been made in the original plans for three additional penstocks, and these are now being installed, so that future increases will consist of purchase of new generating units and necessary switches, transformers, etc., only.

On June 30 the foundations, concrete draft tubes, etc., had been placed and erection of penstocks about 10 per cent completed. Contracts have been let for the necessary equipment.

After the installation of the new unit there will be available at the hydro station a capacity of 13,140 k. w., with provision for future installation of two more units of 4,500 k. w. each, making the ultimate capacity of the hydro station 22,140 k. w. This capacity will provide for about double the present load and will also provide about a 50 per cent reserve over and above any increases in load now contemplated. Further increase in capacity would require radical change of station layout and would involve a prohibitive expense.

It should be kept in mind that additional power can probably be produced at the Miraflores steam plant more cheaply than by a new project at Gatun hydro station or by new hydraulic developments elsewhere, such as at Alhajuela or Miraflores.

With respect to available water supply for power purposes, it is estimated that with all six units installed at the hydro plant and operating at about 70 per cent load factor there will be required approximately 2,600 cubic feet per second.

It is expected to continue the Miraflores steam plant as a reserve and to keep its capacity at about two-thirds that of the hydro station. This will necessitate an increase in capacity there in the near future, for which estimates will be submitted for 1919.

The total connected load at the end of the year was approximately 55,372 k. w. in power and heat and 5,744 k. w. in light,

The load factor is approximately 70 per cent and the demand factor is approximately 15 per cent.

The principal loads (in k. w.) added during 1917 were:

	Power.	Light.
Balboa coaling station.....	1,267	100
Army quarters and buildings.....		100
Employees quarters.....	400	300
Dry Dock No. 1, Balboa.....	6,040	10
Air compressor plant, Balboa.....	1,600	3
New hospital, Ancon.....	30	25
Cold storage and ice plant, Balboa.....	450	8
Laundry, Ancon.....	100	20
New restaurants, Balboa and Cristobal.....	20	8
New dispensary, Ancon.....	5	10
New schools.....		20
Miscellaneous municipal buildings.....		200
Other miscellaneous items.....	1,000	500
Total.....	10,912	1,304

The known loads to be added in future are:

	Power.	Light.
Series street lighting systems.....		100
Submarine charging station and aviation.....	3,000	100
New cold storage plant, Cristobal.....	1,800	20
New town sites.....	200	400
Storage battery charging station, Cristobal.....	150	
Pacific forts.....	245	155
Miscellaneous municipal buildings.....	100	100
New air compressor plant, Balboa.....	1,000	
New air compressor, Cristobal.....	500	
Permanent Army posts.....		800
New piers.....	200	300
Total.....	7,195	1,975

Table showing monthly outputs in kilowatt hours:

Month.	Net output in kilowatt hours.		Total net generated power.	Per cent loss in transmission based on total delivered power.
	Gatun hydro station.	Miraflores steam station.		
1916.				
July.....	3, 672, 750	+ 153, 090	3, 825, 840	12. 56
August.....	3, 900, 890	+ 291, 444	4, 192, 334	14. 25
September.....	3, 319, 860	+ 389, 280	3, 709, 140	13. 9
October.....	3, 455, 470	+ 475, 840	3, 931, 310	13. 5
November.....	4, 028, 220	+ 212, 480	4, 240, 700	14. 85
December.....	4 130, 640	— 55, 285	4, 075, 355	16. 6
1917.				
January.....	4, 235, 000	— 133, 140	4, 101, 860	13. 7
February.....	4, 282, 400	— 152, 135	4, 130, 265	14
March.....	4, 582, 100	— 141, 860	4, 440, 240	14. 6
April.....	4, 401, 600	— 79, 650	4, 321, 950	14. 2
May.....	4, 810, 400	— 40, 790	4, 769, 610	16. 8
June.....	4, 772, 300	— 122, 640	4, 649, 660	16
Average.....	4, 132, 620	.....	4, 199, 020	14. 6

NOTE.—Miraflores steam station is run as a reserve station and one generator is always floated on the line to automatically pick up load. It runs most of the time as an overexcited synchronous condenser for power-factor correction.

The following table shows the cost of power in its various states of distribution. Cost figures are based on delivery to consumer and not on the net amount actually generated.

	Totals for fiscal year 1916-17.	Average per month.	Average cost per kilowatt hour.
Net consumption (kilowatt hours)	43,743,902	3,645,325	.....
Cost of operation and maintenance, hydro station.....	\$27,525.80	\$2,293.82	\$0.000629
Cost of operation and maintenance, Miraflores steam plant.....	72,405.07	6,033.76	.001655
Cost of operation and maintenance of substations	52,629.30	4,385.77	.001203
Cost of maintenance, transmission lines.....	19,965.11	1,663.76	.000456
Cost of maintenance, distribution lines.....	50,866.59	4,238.88	.001163
Depreciation, transmission system.....	96,000.00	8,000.00	.002195
Total cost of current for power distribution	319,391.87	26,615.99	.007301
Net consumption, lighting current (kilowatt hours).....	8,245,912	687,159	.....
Cost of maintenance, house-lighting system, including lamp renewals.....	\$50,129.40	\$4,177.45	\$0.006079
Cost of lighting current per kilowatt hour.....			.013380

Plate No. 2 shows the average and maximum loads in kilowatts for the week ending June 30, 1917, as compared to the same period in 1916.

SUBSTATIONS AND TRANSMISSION LINES.

The substations operated satisfactorily during the year. There were no failures of high-tension service due to failure or improper operation of substation apparatus.

The following changes and additions to equipment have been made:

Transferred one 2,667 k. v. a. 44,000-volt transformer from Gatun substation to Cristobal substation and installed two 4,000 k. v. a. 44,000-volt transformers at Gatun substation. This increased the capacity of Cristobal substation from 5,334 k. v. a. to 8,001 k. v. a. and of Gatun substation from 8,001 k. v. a. to 13,334 k. v. a.

One additional feeder equipment was installed in Balboa and one in Cristobal substations to provide for new outgoing 2,200-volt feeders.

The operation of the 44,000-volt transmission line has been fairly satisfactory. Plate No. 3 shows the number and causes of power interruptions during the year. Plate No. 4 shows the locations and dates of insulator failures during the year.

Since April 2, 1917, the spare transmission line has been kept charged at all times.

Plans are under way for the installation of a fourth disk on each insulator and for the operation of the transmission lines in parallel.

There were 3 cases of ground wire breaking during the year, as compared with 10 in 1916 and 13 in 1915.

DISTRIBUTION LINES.

There were two interruptions to service during the year, due to defects in the distribution system cable, one being caused by moisture in a piece of 2,500-volt 3-conductor, lead-covered cable, and the other caused by the parting of the submarine cable supplying power to Fort Sherman.

A total of 185,624 feet of new cable of various sizes and voltages was laid during the year; 38,510 duct feet of fiber duct and 78,672 duct feet of vitrified tile duct were placed, covering extensions to the system to provide for new town sites and various power and light loads added or increased during the year. The 2,200-volt overhead feeder from Miraflores substation to Paraiso was removed, leaving a 11,000-volt overhead line feeding the Army camps on the west side, and the dredging division relay pumps in the Cut, a 2,200-volt overhead line feeding the Balboa relay pumps, and some overhead lines at Mount Hope used for miscellaneous installations as practically the only overhead lines left in service, all the main distribution systems being underground.

Complete lighting systems were installed in 86 Army buildings, 45 Panama Canal and Panama Railroad buildings, and 991 apartments for gold and silver employees during the year. All wiring was laid in galvanized-iron conduit, both in concrete and frame buildings, and substantial fixtures were used throughout. Following are some of the principal items used in this work; 624,585 feet of conduit, galvanized iron, all sizes; 294,731 conduit fittings, galvanized iron,

various; 27,986 conduit fittings, current-carrying parts; 1,657,203 feet of wire, rubber-covered, 0-600 volts, all sizes; 14,220 fixtures, light brass, various.

A total of 86 new series incandescent street lamp-posts, including combination fire-alarm posts, were installed, requiring 22,450 feet of No. 6 single-conductor 2,500-volt armored cable. The installation of street lights in the New Cristobal town site was begun but is not included in the above figures.

The total number of incandescent lamps in service on the Canal Zone of all sizes on June 30, 1917, was approximately 57,957.

The average number of incandescent lamps renewed per month was 10,000.

The number of electric appliances in use by Panama Canal employees in quarters (Army not included) was: Electric flatirons, 1,663; electric hot plates, percolators, toasters, etc., 798; small fans, sewing-machine motors, vibrators, etc., 150; electric ranges (average 5 k. w. each), 60.

ARMATURE REPAIRS, ETC.

The following jobs were handled in the armature winding and repair shop during the year:

Motors and armatures rewound, 1 h. p. to 500 h. p.-----	183
Transformers repaired and rewound-----	56
Small fans and electric appliances repaired-----	127
Magnetos and miscellaneous repairs-----	117
Manufacturing jobs, switchboard panels, etc-----	147
Total-----	630

This does not include repairs done in the field at various points, but covers only such jobs as required complete rewinding and shopwork.

RAILWAY SIGNAL SYSTEM.

There were 2,474,210 arm movements with 115 responsible signal interruptions, compared with 199 for 1916, and 12 nonresponsible signal interruptions, compared with 43 for 1916, and 431 train-minutes delay, compared with 721 for the preceding year. There was one false clear operation of signal for 2,474,210 arm movements. There was an average of one failure per 21,515 arm movements in 1917, compared with one failure per 14,685 arm movements in 1916. The average delay to trains per signal failure was 37 minutes.

There was one reported false clear aspect and one reported false caution aspect on the 118 automatic, 16 semiautomatic, 14 power-operated, and 30 mechanical signals during the fiscal year 1917.

The mechanical interlocking plant at West Leg was removed in the early part of September. The main line crossover at this location was removed. On the spur leading to the quartermaster's shop a hand-throw derail was installed. The main line northward and southward signals of this plant were made to work automatically. There was one new automatic signal style "B" installed on the northward main at a point opposite the southward signal, formerly home signal for plant. There was a main line crossover installed just north of Tivoli spur and a hand-throw derail installed on this spur.

During February, this year, the remaining overhead wires from old West Leg interlocking plant to San Miguel crossing were removed and nine conductor Kerite cable installed.

Derails on both ends of passing sidings at New Culebra and Bohio were removed. The main line crossover at New Culebra was removed. A new house track and spur were installed at New Culebra, and a hand-throw derail installed on the south end of this house track.

Two main line spurs for the building division were installed, one at Pedro Miguel and one at Red Tank. Also one automatic signal No. 4122 moved 100 feet north, and a spur installed off the main line at this place for the new commissary at Red Tank. Near Mindi Bridge a switch was installed for a spur track. This was equipped with a hand-throw derail.

A Heeschen highway crossing gong is being installed on crossing at Pedro Miguel. The interlocking plant has also been completely overhauled.

Practically all the remaining porcelain primary battery jars were replaced by 700 heat-resisting glass, or enough for about 40 signal locations. This makes all primary jars of the heat-resisting glass type.

The interlocking plant at Mount Hope was overhauled.

The interlocking plant at Cristobal tower "A" was removed and track changes made. The tracks to docks were cut in near Colon passenger station

on track over new fill back of United Fruit Company's office. The removal of this interlocking plant made it necessary to make changes in automatic signals between Mount Hope and Colon. Two signals were moved to new locations, three additional automatic signals installed, one cut section moved, and all signals rewired on this job between Colon and Mount Hope.

Some of the signal cable was meggered out. Preparations are being made to megger out all conductors in cable and for card indexing it.

The following are the reported and investigated derailments which occurred at mechanical interlocking plants:

Month.	Plant.	Cause.
1916.		
July.....	Pontoon bridge.....	Rails spreading, no fault of interlocking apparatus.
Do.....	West Leg.....	Outside interlocking plant, debris on track.
August.....	Tower "A".....	Disregard of dwarf signal in stop aspect.
October.....	Diablo.....	Do.
November.....	do.....	Disregard of home signal in stop aspect.
1917.		
February.....	do.....	Disregard of dwarf signal in stop aspect.
Do.....	Pedro Miguel.....	Broken flange on rock car.
March.....	Diablo.....	Leverman threw derail under train.
May.....	Balboa Heights.....	Disregard of dwarf signal in stop aspect.

Derailments caused by disregarding signal in stop aspect.....	4
Derailment caused by accident to car.....	1
Derailments caused by levermen.....	2
Derailments caused by debris on track, rails spreading.....	2
Total.....	9

There was damage done to interlocking apparatus by material falling from cars while passing through interlocking plants in several instances.

There was but one derailment caused by trainmen throwing derail under moving train at sidings and spurs.

There were 30 reported signal failures at interlocking plants. This includes both electrical and mechanically operated signals.

Responsible signal interruptions for fiscal year ending June 30, 1917.

1916.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Track circuits:						
Exhausted primary battery; poor maintenance.....	1					
Switch box out of adjustment; shunting track.....	1	2	1			
Poor battery; dirty connection; battery not properly set up.....	3					4
Leakage.....	1			1		
Poor zinc; track battery.....		1		1		
Short circuit account of insulated joints.....		1		1		
Switch box out of adjustment; switch point in poor condition.....				2		
Bad relay contact.....						2
Loose connections on magnet coils; track relay.....						2
Track relay out of adjustment.....						
Broken bond wires.....						
Exhausted storage battery while removing primary battery; careless maintenance.....	1					
Signal light out.....		1				
Meter com. sticking, dirty connection; brushed high bars, etc.....		3	1	1	1	1
Broken primary battery jars.....		1	1			1
Unknown.....		2	1	1	2	3
Uncertain aspect; broken slot-arm spring.....		1				
Open coil on control relay.....			1	1		1
Loose connection on relay coils.....			1			
Cable connections open.....			1		2	
Open connections on porcelain terminal.....					4	
Broken semaphore shaft.....						1
Discharged storage battery.....						3
Pole changer; loose connection.....						
Broken split cotter on slot arm.....						
Track circuit; track resistance not properly adjusted.....						
Exhausted primary battery; careless maintenance.....						
Defective primary battery.....						
Total.....	7	12	6	7	9	13

Responsible signal interruptions for fiscal year ending June 30, 1917—Continued.

1917.

	Jan.	Feb.	Mar.	Apr.	May.	June.	Total for year.	Percentage for year.
Track circuit:								
Exhausted primary battery; poor maintenance.....					2		3	44.3
Switch box out of adjustment; shunting track.....					1		5	
Poor battery; dirty connection; battery not properly set up.....				4			11	
Leakage.....						2	4	
Poor zinc; track battery.....				3		1	6	
Short circuit account of insulated joints.....							1	
Switchbox out of adjustment; switch point in poor condition.....		4					6	
Bad relay contact.....	1						3	
Loose connections on magnet coils; track relay.....							2	
Track relay out of adjustment.....	1			3			4	
Broken bond wires.....	2	2	2				6	.87
Exhausted storage battery while removing primary battery; careless maintenance.....							1	
Signal light out.....			3	3			7	
Meter com. sticking, dirty connection; brushed high bars, etc.....			1				8	
Broken primary battery jars.....						1	3	
Unknown.....			1	2	3	3	19	
Uncertain aspect; broken slot arm spring.....							1	
Open coil on control relay.....	2						5	
Loose connection on relay coils.....	1						1	
Cable connections open.....	1						3	
Open connections on porcelain terminal.....							4	.87
Broken semaphore shaft.....							1	
Discharged storage battery.....							3	
Pole changer; loose connection.....		1					1	
Broken split cotter on slot arm.....				2			2	
Track circuit; track resistance not properly adjusted.....					1		1	
Exhausted primary battery; careless maintenance.....					2		2	
Defective primary battery.....					2		2	
Total.....	7	8	8	18	11	4	115	100

TELEPHONES AND TELEGRAPH.

During the fiscal year 762 telephones were installed and 486 removed, leaving in service on June 30, 1917, a total of 2,154 telephones. The average number of telephone calls per day, obtained by peg count, was 21,042. The average number of telephone troubles, including cases on all classes of subscribers' instruments and all wire except cable, was 8 per day, as compared with 13 per day for the last fiscal year.

There were 89,342 feet of cable of all sizes installed and 20,827 feet were removed, leaving 536,763 feet in service. On this entire length of cable there were 11 cases of trouble.

Concrete booths for train dispatchers' telephones and trans-isthmian line patrolmen's telephones were installed along the right of way of the Panama Railroad.

New storage batteries were installed at the Colon, Pedro Miguel, and Balboa exchanges. New sections of switchboard were installed in the Colon and Balboa exchanges. Work for local telephone companies in Colon and Panama, and for the Central & South American Telegraph Company was performed during the year, on account of destructive fires, installation of new trans-isthmian cable, etc.

The rapid increase in the number of telephones in use by the Army and by pay subscribers has taxed the system to its utmost capacity. Additional cable must be installed in the trans-isthmian line, new sections must be added to the Balboa main frame, and a new exchange must be provided at Cristobal in the near future.

FIRE-ALARM SYSTEM.

The usual inspection and maintenance of this system was carried on during the year. Several extensions were made to the system, including an extension to Balboa shops, to Pier No. 7, Colon, to the new town site of Balboa, and

the New Cristobal town site. Experiments were made with various methods of applying red letters and red bands to the street lighting globes on the combination fire-alarm posts, but entirely satisfactory results have not as yet been obtained.

BUILDING DIVISION.

The construction plan outlined in the report of the resident engineer for the fiscal year 1916 was carried out during this fiscal year with very satisfactory results.

The increasing cost of cement, lumber, and steel has made necessary the consideration of reinforced concrete columns, beams, and girder construction with hollow concrete block panels and partition walls. A few low buildings of this character were designed, and preliminary costs indicate a considerable saving. The manufacture of concrete blocks continued throughout the year with satisfactory results.

The details of the operations of the building division during the fiscal year are covered in the report of the resident engineer which follows:

BUILDING DIVISION.

Hartley Rowe, Resident Engineer.

ORGANIZATION.

The following changes were made in the organization of the division during the year:

Mr. George M. Wells, resident engineer, resigned on February 3, 1917, and the undersigned was appointed in his stead.

Assistant Engineer T. C. Morris was made engineering assistant to the resident engineer effective December 1, 1916.

The Central District was consolidated with the Southern District on May 1, 1917, with Mr. J. B. Fields, superintendent, in charge of the district. The construction of the submarine base at Coco Solo was placed in charge of Mr. C. C. Snedeker on June 19, 1917. The Northern District remained in charge of Superintendent James Cosgrove.

Mr. Samuel M. Hitt continued in charge of the architectural designing work.

BUILDING OPERATIONS.

The following table shows the buildings authorized by Congress for The Panama Canal and for the Army, and buildings authorized by the Panama Railroad, on which construction work was performed during the fiscal year.

PANAMA CANAL BUILDINGS.

Item.	Description.	Number of buildings.	Class.	Date started.	Per cent completed, June 30, 1917.	Cost to June 30, 1917.
1	Ancon Hospital dispensary.....	1	I. 2-story.....	Aug., 1916	100	\$59,338.99
2	Ancon Hospital laboratory.....	1	I. 2-story.....	May, 1916	100	97,935.32
3	Ancon Hospital ward group, including main stairway.	1	I. 2-story and basement.	May, 1916	100	196,600.95
4	Hog barn, Corozal farm.....	1	M. 1-story.....	Sept., 1916	100	5,095.61
5	Morgue, Colon Hospital.....	1	I. 1-story.....	May, 1916	100	4,471.82
6	Garage and quarters, Colon Hospital.	1	D. 2-story.....	Dec., 1916	100	6,212.01
7	Quarters for doctors, Colon Hospital.	1	D. 2-story and basement.	July, 1916	100	26,150.60
8	Dispensary, Pedro Miguel.....	1	I. 2-story.....	Dec., 1916	80	23,034.30
9	Office building, dentists and sanitary inspectors.	1	I. 2-story.....	Jan., 1917	80	17,784.42
10	Storehouse, electrical.....	1	F. 3-story.....	June, 1916	100	80,668.49
11	Storehouse, paint.....	1	H. 1-story.....	July, 1916	100	27,882.32
12	Storehouse, lumber.....	1	L. 1-story.....	July, 1916	68	112,496.14
13	Storehouse, general.....	1	K. 1-story.....	June, 1916	100	41,154.82
14	Motor truck garage, Ancon.....	1	A. 1-story.....	July, 1916	100	19,493.04

PANAMA CANAL BUILDINGS—Continued.

Item.	Description.	Number of buildings.	Class.	Date started.	Per cent completed, June 30, 1917.	Cost to June 30, 1917.
15	4-family quarters, Balboa.....	4	D. 2-story.....	June, 1916	100	\$99,016.51
16	1-family quarters, Ancon-Balboa.....	100	A. 1-story.....	May, 1916	100	246,052.31
17	4-family quarters, Ancon-Balboa.....	74	A. 2-story.....	Aug., 1916	100	464,606.30
18	1-family quarters, Cristobal.....	25	A. 1-story.....	Apr., 1917	60	47,718.37
19	4-family quarters, Cristobal.....	19	A. 2-story.....	Apr., 1917	60	112,410.83
20	1-family quarters, Pedro Miguel.....	16	A. 1-story.....	Aug., 1916	100	35,592.79
21	4-family quarters, Pedro Miguel.....	12	A. 2-story.....	Aug., 1916	100	68,717.61
22	12-family silver quarters.....	32	A. 2-story.....	July, 1916	95	182,739.90
23	Hotels, Cristobal, Balboa, Ancon.....	3	J. 1-story.....	Aug., 1916	90	200,746.75
24	Balboa shops, mess and pattern-making shop.....	1	J. 2-story.....	Feb., 1916	90	46,372.33
25	Grand stand, Balboa.....	1	M. 1-story.....	Aug., 1916	100	29,433.81
26	School buildings, Cristobal, Gatun, Pedro Miguel, Ancon, Balboa.....	5	{ I. 2-story..... 1. 1 and 2-story.....	{ June, 1916	80	349,739.95
27	Ancon Hospital administration building.....	1	D. 3-story.....	Mar., 1917	25	53,794.40

PANAMA RAILROAD BUILDINGS.

1	Freight and baggage building.....	1	K. 1-story.....	June, 1916	100	\$53,069.35
2	Freight and baggage building extension.....	1	K. 1-story.....	Aug., 1916	100	123,454.14
3	Electric charging station.....	1	H. 1-story.....	Mar., 1916	100	23,529.27

ARMY BUILDINGS.

FORT GRANT.						
1	Barracks, company.....	2	B. 2-story.....	July, 1916	100	\$75,565.86
2	Noncommission quarters.....	2	B. 2-story.....	July, 1916	92	30,731.36
3	Lieutenants' quarters.....	2	D. 2-story and basement.....	Oct., 1916	77	42,942.34
4	Field officers' quarters.....	4	D. 2-story and basement.....	Oct., 1916	99	66,095.21
5	Commanding officers' quarters.....	1	D. 2-story and basement.....	Oct., 1916	100	17,140.35
6	Captains' quarters.....	2	D. 2-story and basement.....	Nov., 1916	99	36,972.93
7	Barracks, band.....	1	B. 2-story.....	Dec., 1916	100	16,678.06
8	Barracks, special.....	1	B. 2-story.....	Dec., 1916	100	51,824.54
9	Family quarters.....	1	A. 1-story.....	Apr., 1917	100	2,706.08
10	Lieutenants' bachelor quarters.....	1	D. 2-story and basement.....	Mar., 1917	60	23,869.61
11	Band stand.....	1	N. 1-story.....	May, 1917	60	2,661.83
FORT SHERMAN.						
12	Barracks, company.....	5	A. 2-story.....	Oct., 1916	100	123,944.33
13	Headquarters building.....	1	A. 2-story.....	Oct., 1916	95	32,656.61
14	Noncommission quarters.....	5	A. 2-story.....	Dec., 1916	95	30,257.22
15	Captains' quarters.....	6	A. 2-story.....	Mar., 1917	95	40,027.02
16	Commanding officer's quarters.....	1	A. 2-story.....	Mar., 1917	100	6,842.38
17	Field officers' quarters.....	3	A. 2-story.....	Mar., 1917	90	20,029.38
18	do.....	1	A. 2-story.....	Mar., 1917	100	6,816.00
19	Lieutenants' quarters.....	5	A. 2-story.....	Mar., 1917	60	42,771.60
20	Lieutenants' bachelor quarters.....	1	A. 2-story.....	Mar., 1917	90	12,820.82
21	Band barracks.....	1	A. 2-story.....	Feb., 1917	100	8,119.18
22	Incinerator.....	1	H. 2-story.....	June, 1917	10	4,496.92
FORT RANDOLPH.						
23	Barracks, company.....	2	A. 2-story.....	Oct., 1916	100	50,136.00
24	Captains' quarters.....	2	A. 2-story.....	Oct., 1916	100	13,957.26
25	Field officers' quarters.....	1	A. 2-story.....	Oct., 1916	100	9,241.28
26	Noncommission quarters.....	1	A. 2-story.....	Nov., 1916	100	8,035.77
27	Lieutenants' bachelor quarters.....	1	A. 2-story.....	Feb., 1917	100	12,281.02
FORT DE LESSEPS.						
28	Noncommission quarters.....	3	B. 2-story.....	Dec., 1916	50	31,556.43
29	Captains' quarters.....	3	B. 2-story and basement.....	Dec., 1916	80	47,746.95
30	Field officers' quarters.....	2	B. 2-story and basement.....	Jan., 1917	80	28,453.64
31	Headquarters, barracks, storehouse.....	1	B. 2-story.....	Jan., 1917	40	47,004.09

ORDNANCE DEPARTMENT BUILDINGS.

Item.	Description.	Number of buildings.	Class.	Date started.	Per cent completed, June 30, 1917.	Cost to June 30, 1917.
1	1-family quarters.....	10	A. 1-story.....	Jan., 1917	100	\$25,930.65
2	Barracks.....	1	B. 2-story.....	Feb., 1917	70	16,681.65
3	Stable and carriage building.....	1	M. 1-story; part 2-story.	Feb., 1917	90	2,732.45
4	Commanding officer's quarters.....	1	B. 2-story and basement.	Feb., 1917	40	8,530.03
5	Captains' quarters.....	1	B. 2-story and basement.	Feb., 1917	45	9,813.24
6	4-family noncommission quarters...	1	B. 2-story and basement.	Feb., 1917	100	12,406.78
7	Shop building.....	1	K. 1-story.....	Feb., 1917	40	7,514.44
8	Double magazine building.....	1	H. 2-story.....	Feb., 1917	100	16,207.20
9	Oil storehouse.....	1	H. 2-story.....	Feb., 1917	80	6,488.57
10	Current issue and reserve storehouse.	1	K. 1-story.....	Feb., 1917	40	28,905.68
11	Toilet building.....	1	N. 1-story.....	Feb., 1917	90	1,115.81

In addition to the work outlined in the above tables a considerable number of buildings were erected for the different divisions and the Panama Railroad Company, and as the necessity for guarding the Canal Zone became evident various barracks and shelters were authorized and constructed. Wire fences were constructed around the locks at Gatun, Pedro Miguel, and Miraflores, the powder magazines at Gamboa and New Culebra, and the substations at Cristobal, Gatun, Miraflores, and Balboa.

Other items of special work performed by the division consisted of additions and alterations to buildings 6, 7, and 9, Balboa shops; alterations to Balboa and Cristobal commissaries; the construction of Young Men's Christian Association buildings at Paraiso and Cristobal; and repairs and alterations to the administration building at Ancon for use as a headquarters' building for United States troops.

In addition to the regular work of the designing forces for The Panama Canal they have been called upon to furnish preliminary plans and estimates for cantonment construction for Army troops and for the proposed permanent posts for mobile troops on the Canal Zone.

The following table gives the comparative unit cost of the principal buildings completed during the past fiscal year:

TABLE OF COMPARATIVE UNIT COSTS OF BUILDINGS.

Item.	Name of building.	Class.	Cost of project.	Foundations.	Handling material.	Plumbing.	Electrical work.	Municipal work.	Elevators.	Cost of building.			Cubical contents (feet).	Cost per cubic foot.
										Labor.	Material.	Total.		
1	Ancon Hospital dispensary.	I. 2-story.	\$59,338.99	.....	\$3,562.64	\$5,755.20	\$2,276.05	\$51.32	.....	\$24,955.14	\$22,738.64	\$47,693.78	102,453	\$0.2036
2	Ancon Hospital laboratory.	I. 2-story.	97,935.32	.....	6,003.50	8,564.70	3,477.49	196.50	.....	41,047.10	36,436.21	77,483.31	244,063	.3167
3	Ancon Hospital, group No. 5.	I. 2-story.	182,703.65	.....	15,946.23	13,230.17	10,817.42	655.22	5,057.06	71,105.42	65,892.13	136,997.55	488,090	.2803
4	Colon Hospital morgue.	I. 1-story.	4,471.82	.....	383.47	190.63	105.38	83.03	.....	2,168.01	1,541.30	3,709.31	10,880	.3409
5	Cristobal restaurant.	I. 1-story.	74,128.13	.....	3,132.33	2,273.81	1,624.92	628.19	.....	28,335.15	38,133.73	66,468.88	316,869	.2098
6	Balboa restaurant.	I. 1-story.	70,014.96	.....	2,405.48	1,826.37	1,452.98	105.79	.....	24,000.21	38,724.13	62,724.34	316,869	.1980
7	Paint storehouse.	I. 1-story.	27,882.85	.....	1,829.06	1,681.42	700.56	350.34	.....	8,490.84	17,192.38	25,683.22	216,600	.1186
8	General storehouse.	K. 1-story.	47,343.88	.....	4,556.50	982.55	1,539.89	654.87	.....	26,922.02	47,712.30	74,634.32	383,376	.0893
9	Electrical storehouse.	F. 3-story.	81,454.72	.....	4,556.50	982.55	1,539.89	654.87	4,050.40	.....	.....	.....	659,240	.1258
10	Type I (rev. (116 buildings)).	A. 1-story.	2,436.90	943.45	383.69	319.67	520.60	60.83	.....	26,535.35	1,225.88	27,761.23	32,197	.0760
11	Type I (rev. (86 buildings)).	A. 2-story.	5,569.96	50.63	197.25	784.02	530.60	60.83	.....	1,312.14	3,276.49	4,588.63	60,412	.0760
12	Silver married apartments (26 buildings).	A. 2-story.	5,569.96	66.35	379.70	362.61	217.95	73.02	.....	1,204.15	3,204.18	4,408.33	86,111	.0519
13	Silver bachelor apartments (2 buildings).	A. 2-story.	5,443.23	118.65	323.15	668.19	210.91	7.43	.....	1,143.81	2,971.09	4,114.90	86,111	.0478
14	4-family concrete quarters (4 buildings).	D. 2-story.	24,754.13	.....	1,369.42	1,595.57	706.85	60.54	.....	10,282.70	10,739.05	21,021.75	114,275	.1839
15	4-family concrete quarters, doctors', Colon.	A. 2-story.	26,150.60	.....	1,209.46	1,692.45	897.93	.....	.....	11,402.23	10,888.53	22,330.76	114,275	.1955
16	Paraiso Clubhouse.	A. 3-story.	16,001.57	553.80	851.54	1,225.45	1,369.18	120.94	.....	4,512.78	7,367.79	11,880.57	328,760	.0361
17	Cristobal Clubhouse (silver).	A. 3-story.	15,776.33	646.98	836.94	787.20	916.91	162.25	.....	4,413.98	8,012.07	12,426.05	328,760	.0378
18	Local freight and baggage building, Cristobal.	K. 1-story.	176,523.49	.....	6,229.40	2,148.12	3,444.83	.....	.....	45,529.21	119,171.93	164,701.14	1,435,614	.1147
19	Atlantic terminal building.	I. 3-story.	86,993.80	9,282.92	4,512.42	4,562.54	2,765.13	411.59	.....	31,062.04	34,397.16	65,459.20	357,600	.1830
20	Lumber and steel storage building.	L. 1-story.	115,933.94	.....	4,011.38	.....	.....	1,833.33	.....	10,906.88	99,202.35	110,109.23	3,374,400	.0326
21	Colon Hospital garage.	I. 2-story.	6,212.01	.....	168.53	251.04	59.62	77.70	.....	3,654.08	2,001.04	5,655.12	19,110	.2959
22	Silver family quarters, Brazos Brook.	A. 1-story.	3,722.80	125.23	255.54	190.71	.....	215.07	.....	871.84	2,064.41	2,936.25	40,365	.0727
23	Grand stand, Balboa.	A. 1-story.	29,433.81	.....	1,794.50	1,026.18	385.74	256.48	.....	10,535.85	15,435.06	25,970.91	367,200	.0707
24	Repair shop and electric-charging station, Cristobal.	H. 1-story.	23,529.27	.....	1,631.07	32.72	1,415.74	69.04	.....	10,841.41	9,539.29	20,380.70	235,824	.0864
ARMY BUILDINGS.														
25	Commanding officer's quarters, Fort Grant.	E. 2-story.	17,706.40	.....	934.88	986.83	566.05	26.88	.....	7,631.82	7,559.94	15,191.76	60,886	.2495
26	Field officers' quarters (4), Fort Grant.	E. 2-story.	17,089.85	.....	863.38	934.19	566.05	28.04	.....	7,720.42	6,977.77	14,698.19	60,886	.2414
27	Captains' quarters (2), Fort Grant.	D. 2-story.	19,223.64	.....	790.70	1,282.57	737.18	.....	.....	8,329.95	8,083.24	16,413.19	78,487	.2091
28	Band barracks (1), Fort Grant.	B. 2-story.	17,079.56	.....	560.59	1,040.31	419.21	37.27	.....	6,631.47	8,383.71	15,021.18	96,768	.0155
29	Special barracks (1), Perico.	B. 2-story.	52,634.13	.....	2,437.18	3,906.03	834.59	515.69	.....	14,677.40	30,263.24	44,940.64	308,562	.1486
30	Type I (rev. (1), Perico.	A. 1-story.	2,896.96	.....	129.64	266.06	190.88	169.96	.....	724.57	1,415.89	2,140.42	23,197	.0622
31	Barracks (5), Fort Sherman.	A. 2-story.	24,788.87	2,237.14	502.18	2,416.85	1,051.76	47.36	.....	6,789.10	11,747.48	18,536.58	294,424	.0629

32	Type 20, staff, captains' quarters, Fort Sherman.	A. 2-story; 1-family (6).	6, 671.17	89.98	79.94	646.81	245.00	.....	1, 866.65	3, 702.79	5, 569.44	46, 474	.1198
33	Band barracks (1), Fort Sherman.	A. 2-story	8, 119.18	1, 077.10	243.83	836.13	378.68	.....	3, 163.52	2, 419.92	5, 583.44	98, 280	.0588
34	Type 17-rev. (ordnance) (1), Fort Sherman.	A. 1-story	2, 274.96	70.68	28.67	289.14	156.36	.....	598.92	1, 131.19	1, 736.11	23, 197	.0745
35	Barracks (2), Fort Randolph.	A. 2-story; 100 men.	25, 068.00	1, 512.23	616.96	2, 586.06	1, 013.90	162.60	6, 137.22	13, 039.03	19, 176.25	294, 424	.0651
36	Type 20, captains' quarters (2), Fort Randolph.	A. 2-story; 1-family.	6, 978.63	563.70	150.15	633.78	508.87	85.04	2, 273.98	2, 763.11	5, 037.09	46, 474	.1053
37	Type 8, field officers' quarters (1), Fort Randolph.	A. 2-story; 1-family.	9, 241.28	621.59	214.23	623.27	532.00	85.52	3, 302.62	3, 862.05	7, 164.67	71, 904	.0996
38	Type 14-rev., noncommissioned officers' quarters (1), Fort Randolph.	A. 2-story; 4-family.	8, 035.77	598.72	67.13	995.52	786.43	47.29	1, 677.86	3, 862.82	5, 540.68	60, 412	.0917
39	6-set lieutenants' bachelor quarters (1), Fort Randolph.	A. 2-story	12, 231.02	673.34	512.83	1, 003.28	1, 071.70	.....	3, 831.29	5, 188.58	9, 019.87	118, 064	.0763
40	Type 17-rev. (ordnance) (1), Fort Randolph.	A. 1-story; 1-family.	2, 056.70	26.38	32.88	260.21	154.01	147.20	576.61	859.41	1, 436.02	23, 197	.0619

DESCRIPTION OF VARIOUS CLASSES OF BUILDINGS.

Class A.—Frame; wood post foundations; asphalt shingle roof.
 Class B.—Reinforced concrete exterior walls; wood floors; wood partitions; Spanish red tile on frame roof.
 Class C.—Cement block and stucco walls; wood floors; Spanish red tile on frame roof.
 Class D.—Reinforced concrete bearing walls and floors; cement block partitions; cement plaster; oil painted; Spanish red tile on frame roof.
 Class E.—Cement block and stucco walls; concrete floors; Spanish red tile on frame roof.
 Class F.—Reinforced concrete walls and floor; steel roof trusses; Spanish red tile roof; steel doors.
 Class G.—Reinforced concrete floor; block and stucco walls; asphalt shingles on frame roof.
 Class H.—Two feet thick reinforced concrete walls, floor, and roof; double steel doors.
 Class I.—Reinforced concrete bearing walls; cement block partition; cement plaster; oil painted; tile floor and base; Spanish red tile on frame roof.
 Class J.—Reinforced concrete bearing walls and partitions; cement plaster; enamel painted; tile floors and walls; Spanish red tile on steel trusses.
 Class K.—Reinforced concrete walls and floors; steel roof trusses; corrugated asbestos roof; steel doors.
 Class L.—Structural steel columns, trusses; cement block partitions; corrugated asbestos roof.
 Class M.—Reinforced concrete foundations and walls; asphalt shingles on frame roof.
 Class N.—Reinforced concrete foundations and walls; Spanish red tile on frame roof.

The following is a description of some of the principal buildings constructed or in the course of construction during the past fiscal year:

SCHOOLS.

Five permanent school buildings have been erected during the past year and will be ready for occupancy the day of the opening of the fall term, October 1, 1917.

The type of construction of all these buildings is reinforced concrete exterior walls, and in most instances the interior walls, the remaining being hollow concrete blocks, cement plastered, and reinforced concrete floor slabs and stairs throughout. Finished floors in classrooms, teachers' rooms, libraries, offices, and assembly room are select narrow yellow pine, on wood sleepers buried in concrete. Finished floors in entrance halls, interior corridors, and libraries are 6-inch square vitreous red tile. The toilet finished floors are vitreous ceramic white-mat tile, and the toilets have also white enameled tile wainscots 5 feet 10 inches high. Stairs have patented safety treads and reinforced concrete newels and handrails, capped with mahogany, and have wrought-iron square balusters. Roofs are red tile, supported on wood framework. The general classrooms in all five schools are 21 feet by 32 feet 6 inches, accommodating 40 pupils, and each room is lighted by three concentrated window openings, each 6 feet 5 inches by 8 feet 2 inches, which admit light over the pupil's left shoulder. Contrary to the usual custom on the Isthmus, hinged sash were not installed, but the northern practice of using vertical sliding sash was employed, this being necessary to allow the use of interior shades for protection from the sun, which would flood the room through such large openings concentrated in one wall. For ventilation small, high windows are generally placed in the opposite wall, opening on a corridor. The schools are not screened, as it is not proposed to use them at night.

All the schools are fully equipped with modern toilet fixtures and marble stalls, and each classroom with bookcases, wardrobes, umbrella racks, and slate blackboards. Each school has a belfry and hellbubbling water supply cooled from a central plant, fire line and hose, fire-alarm system, call gong, telephone period ringing system, and semi-indirect illumination. Walls and ceilings will be painted in light warm tints. Following is a description of the five buildings:

Balboa School.—The building is 117 feet 8 inches by 151 feet 4 inches, three stories high, hollow-square plan, contains 25 standard classrooms, 1 high-school assembly room 32 feet 7 inches by 73 feet 4 inches, 1 laboratory, 3 libraries, 1 supervisor's room, 2 principals' rooms, 2 teachers' rooms, 11 toilets, 3 janitors' rooms, 5 storage rooms, 1 lunch shelter 29 feet 9 inches by 73 feet 4 inches, 1 dry room, 1 bathroom, and 2 closets; a total of 59 rooms, besides an interior patio 57 feet 4 inches by 64 feet 10 inches, surrounded by a three-story porch averaging 9 feet wide, and an entrance loggia 12 feet 3 inches by 74 feet 8 inches, and four staircases.

This building occupies a nearly level site under the Administration Building, and has frontage on three streets. The site is a fill and the building rests on a solid mat of reinforced concrete.

The features of the building are the entrance loggia and the three-story arched patio, grass planted, upon which all the rooms open. This building has a flagpole in front, and an octagonal open belfry of stucco and tile roof tops the highest level of the roof in the rear of the building. This building accommodates all grades from primary and intermediate (first and second floors) to high school (third floor).

Cristobal School.—The building is 56 feet by 166 feet 8 inches, two stories, rectangular plan, contains 15 classrooms, 1 study room 21 feet by 42 feet, 1 laboratory, 1 principal's room, 1 teacher's room, 1 library, 1 lunch room, 6 toilets, 2 janitors' closets, 6 storage closets, and 1 dry closet; a total of 36 rooms, besides a two-story front porch 9 feet 4 inches by 40 feet, an entrance lobby, and an 11-foot wide central corridor running the length of the building, with stairs and secondary entrances at each end.

This school is located on Colon Beach adjacent to the Colon Hospital, where it is convenient for scholars from the New Cristobal town site. The feature of the building is a front entrance portico of four poured concrete columns 24 feet 6 inches high. The building is crowned by a stucco and copper belfry. This school is equipped to accommodate all grades from primary to high school.

Ancon School.—The building is 75 feet 8 inches by 144 feet 10 inches, over-all dimensions, two stories, H-shaped plan, contains 11 classrooms, 1 library, 1

teacher's room, 1 lunch room, 5 toilets, 2 janitors' closets, and 2 storage closets; a total of 23 rooms, besides a vestibule and hall, and a 9-foot 3-inch wide two-story porch running the length of the building, with stair and secondary entrances at each end.

This school is situated well back on a terrace facing the Ancon Plaza. The feature of the building is a two-story arcade, which faces the important street at the back of the school. The building has a square stuccoed open belfry with copper roof.

Pedro Miguel School.—The building is 67 feet by 140 feet 8 inches, over-all dimensions, one-story, U-shaped plan, contains 5 classrooms, 1 teacher's room, 4 toilets, 1 janitor's closet, and 1 storeroom, a total of 12 rooms, besides 208 linear feet of 10-foot wide porch.

This school is located on the top of a small hill not far from Pedro Miguel railway station. It has entrances in the Spanish style and an open square belfry with red tile roof.

Gatun School.—This school is a duplicate of the Pedro Miguel School and is similarly situated on a commanding site at Gatun.

BALBOA SANITARY AND DENTAL BUILDING.

This building, 32 feet 6 inches by 62 feet, is located on the Prado opposite the Balboa dispensary; it is constructed of reinforced concrete resting on a reinforced concrete mat. The roof is red Spanish tile.

The first floor has been designed for the housing of the district dentist and the district sanitary inspector. The dental suite consists of a waiting room for patients, an operating room, a dentist's laboratory, and a ladies' rest room. For the sanitary inspector a workroom and an office have been provided. The building contains also two rooms, to be used for consultation and examination, in conjunction with the dispensary across the Prado.

On the second floor are located the living apartments of the sanitary inspector and a mess and kitchen for the bachelor doctors of the district dispensary.

PEDRO MIGUEL DISPENSARY.

Two stories, 76 feet 4 inches by 36 feet 10 inches. It contains, besides the drug and doctors' rooms of the dispensary, rooms for the district dentist and the district sanitary officer, and on the second story married quarters.

The building is of poured concrete exterior walls and floor slabs, with red tile floors on the first floor; concrete block partitions, wooden floors on the second floor, and a Spanish red tile roof.

BALBOA ELECTRICAL STOREHOUSE.

The building is 62 feet by 164 feet, three stories, averaging 14 feet from floor to floor. It is planned to house all general electrical supplies requisitioned on the Isthmus and is located under Sosa Hill, adjacent to the Balboa substation, and facing the Administration Building. The interior is unbroken by partitions except the office, dry room, tool room, and toilets on the ground floor, and a workshop on the second floor. The stair and elevator shaft carry up in the center of the large rooms, the latter being 8 feet 6 inches by 13 feet. Floors, exterior walls, and columns (in two lower stories only) are reinforced concrete. The roof has steel trusses and purlins, wood rafters, and sheathing bearing Spanish red tile. On the ground floor rolling steel shutters open onto a railroad platform and spur in the rear of the building, and make convenient the use of road vehicles in front.

PERICO ISLAND BARRACKS.

This building is 55 feet 6 inches by 167 feet 6 inches, and has a kitchen and toilet wing 26 feet by 44 feet, all two stories high, with an unglazed green Spanish tile roof. The structure is a subbarracks of the Coast Artillery, and is built on a restricted area between the beach and railroad track. The first floor level is 4 feet above maximum high tide, and a fill was necessary to keep water from under the building. The rear half of the building rests on rock, which falls away so rapidly that it was necessary to support the seaward half with piling.

The exterior walls, stairs, beams, and columns throughout are of reinforced concrete. Interior partitions are wood. The floors are wood, on wood joists,

except those in the kitchen, the toilet wing, and the 8-by-165-foot porch facing the sea, which are concrete.

In addition to the usual accommodations for housing and feeding 150 enlisted men there is a post exchange on the ground floor of the building.

FORT DE LESSEPS COAST DEFENSE HEADQUARTERS—STOREHOUSE AND BARRACKS BUILDING.

This building is L shaped, 195 feet 8 inches by 158 feet 10 inches, over-all dimensions, both wings 68 feet 6 inches wide, with an extra wing in the rear 23 feet 6 inches by 26 feet, all two stories in height and similar in construction to the Perico Island Barracks described above. An open concrete porch, 8 feet wide, with heavy square concrete columns running through both stories, incloses the building. The interior wood partitions are generally of ship lap, 7 feet 6 inches high on one side of the studs; storerooms having space above to the ceiling inclosed with heavy wire mesh. In the dry rooms the wood partitions extend to the ceilings. The fireproof paint and oil rooms are built with concrete floors, ceilings, and walls, and have iron fire doors. The building contains the following rooms: 1 clothing storeroom, 1 table and kitchen utensils' room, 1 clothing issue room, 1 fitting room, 1 general storeroom, 3 boat supplies' rooms, 1 stationery room, 1 artillery engineer's storeroom, and 1 artillery engineer's dry room, 1 ordnance storeroom, 1 ordnance dry room, 1 store and packing room, 2 paint and oil rooms, 1 plumbing shop, 1 carpenter shop, 1 drafting and blue-printing room and platform, 1 dark room, 1 noncommissioned officer's room, and gold and silver toilets; a total of 23 rooms on the first floor. The second floor contains 2 commanding officers' rooms, 1 room for staff, 1 general clerk's room, 1 dispensary, 1 surgeon's room, 1 prophylactic room, 1 hospital squad room, 1 guardroom with 3 cells, 1 post exchange, 1 barber shop, 3 noncommissioned officers' rooms, 1 dormitory (62 beds), 1 dry room, 1 general storeroom, 2 first sergeants' rooms, 1 mess sergeant's room, 1 mess, 1 kitchen, 1 pantry, 1 kitchen storage room, 1 cook's room, 1 tailor's room, 10 dry closets, 1 general toilet, 1 private room, 1 squad room, and 1 closet; a total of 39 rooms on the second floor. The building is located at Fort De Lesseps on a level site overlooking Colon Bay. It is equipped with fire hose outlets and reels, and the second story porch is screened. The freight spur and dock borders one wing of the building, adjacent to the larger store and packing rooms.

FORT GRANT BAND BARRACKS.

The building is 42 feet by 72 feet, two stories high, is situated at the end of the line of type barracks, rear to the sea, and front porch facing the end of the post headquarters building. The type of construction is similar to the Perico Island Barracks in every respect except that the Spanish tile roof is red, in harmony with the other buildings of the Fort Amador section of Fort Grant. In addition to the mess, the first floor contains the band practice room and office, and three rooms for storage of instruments and music. On the second floor is the dormitory. The building accommodates 30 men.

COROZAL ORDNANCE MAGAZINE.

This building, 54 feet by 75 feet in plan, is included in the group of buildings comprising the Panama ordnance depot at Corozal. Unusual features were presented in the design of a building of this character, due to the nature of the material to be stored. The interior is divided on the first floor into two large rooms for the storage of ammunition and other high explosives and one small room for black powder; the second floor, to be used for the storage of inflammable but nonexplosive materials, is not divided. The walls of the building are 2 feet in thickness and heavily reinforced with old 70-pound rails. Interior partitions are from 1 to 2 feet in thickness, reinforced in a similar manner. The second-story walls are of ordinary reinforced concrete construction. To provide against attacks from the air, two roofs, one of which also serves as the second floor, are provided. The upper of these is an ordinary concrete slab roof, while the lower is 2 feet in thickness with 70-pound rail reinforcement. This lower false roof is designed to carry 6 feet of earth and gravel with which the second floor may later be filled as additional protection from the air. Entrances to the building were especially designed from the standpoint of fire protection. They consist of outer fire doors and inner doors of heavy steel-plate and angle construction. Proper ventilation is secured by means of zigzag air ducts likewise protected by steel-plate doors and bars. These ducts

are so designed that no direct line exists between the outer air and the inside of the magazine. The second story is served by hand-operated hoists and trolleys moving upon trolley beams, which telescope into the building so that no openings occur when the doors are closed.

ANCON HOSPITAL.

The construction of the Ancon Hospital group of buildings, begun two years ago, was continued this fiscal year.

Administration building.—This building is the central unit of the entire hospital. The building, three stories and basement in height, with twin towers a story in height, occupies a commanding position in the group overlooking Panama City and the bay, and has been designed with covered passageways connecting it with various other buildings of the hospital group. The building, which is in the shape of the letter U, 154 feet 2 inches by 110 feet 3 inches, overall dimensions, comprises the various clinics, administrative offices, and the entire operating suite. Space has been provided in the basement for the drug dispensary, drug manufacturing department, various storerooms, orderlies' rooms, barber shop, and linen sorting room, with a laundry chute connecting it with the other floors of the building. On the first floor accommodations have been arranged for the eye and ear and medical clinics, X-ray department, waiting rooms for the public, both gold and silver, and throughout the building ample toilet rooms have been provided for both classes of patrons.

The second floor will quarter all administrative departments of the hospital, with offices for the superintendent, chaplain, and clerks, doctors' bed rooms for the officers of the day, general board room, library, and file room.

The entire third floor will be given over to the operating suite and surgical clinic. Four large operating rooms, sterilizing room, doctors' scrub room, orderlies' room, and anesthesia room adjacent to them. This sterilizing room will be equipped with electrical sterilizers, autoclave, etc., and in another portion of the building a sterilizing room with steam sterilizers will be provided for in case of emergencies. A surgical clinic consisting of a surgeon's office, examining rooms for both men and women, cystoscopic room, laboratory and waiting rooms, and doctors' rest room with toilets and lockers, nurses' room with connecting bath and ample linen closets, will also be provided for on the floor.

Ample circulation has been provided between the several floors by means of two reinforced concrete staircases, and an elevator of sufficient size to accommodate little patients. The entire building will be constructed of reinforced concrete bearing walls and reinforced concrete floor slabs, with a Spanish red tile roof supported by a wooden roof of yellow pine timbers. Hot water and steam have been piped throughout the building, and a system of bubbling ice water fountains installed on each floor and supplied from a central cooling system in the basement. The interior of the building will be finished in a most modern, sanitary manner, with walls and ceilings painted with a washable paint and vitreous tile floors, with sanitary cove and base. The special plumbing fixtures will be china, porcelain, and the best of their respective kinds, and provided with knee action supply and waste. All of the electric wiring will be in concealed steel conduits, and the lighting fixtures will be of the most modern types to suit the conditions and finish of their respective rooms.

Kitchen and mess.—Construction on the kitchen and mess of the Ancon Hospital group was started this fiscal year, in conformity with the general scheme of the entire layout. The location of the building is as central as possible, and directly in the rear of the administration building, thereby reducing the distance from the kitchen to the several wards to a minimum.

The building, two stories in height, with a basement under a portion of the first floor on account of the sloping character of the site, occupies a rectangle 51 feet wide and 220 feet long. The building will be constructed of reinforced concrete beams and columns, with reinforced concrete floor slabs and cement block exterior curtain walls and cement block interior partitions. The roof of Spanish red tile will be supported by a yellow pine roof construction, built up from walls and beams.

In the basement provision has been made for a large bakery, refrigerating machinery room, ice cream making room, and toilets and lockers for the kitchen help and colored patients, orderlies, and maids. The main kitchen, storeroom, refrigerator rooms, workroom, diet kitchen, steward's office with

toilet room adjacent, scullery, pantry, and separate dining rooms for the kitchen help, orderlies, maids, silver male and silver female convalescent patients have been arranged for on the first floor.

To facilitate the handling of food to bed patients in the various wards and private rooms, a large elevator, with a capacity of six food carts, will be installed to run between the kitchen and basement floor, at which level the covered passageways lead to the various buildings of the hospital group.

From the basement level two staircases afford access to the second floor, where two large dining rooms have been provided, one for the doctors and nurses and the other for the gold male convalescent patients. These dining rooms will be served from a large pantry between them, fully equipped with steam table, coffee urns, dish-washing machine, linen closet, wash room, and a bank of three electric dumb-waiters to handle food between the main kitchen on the first floor and the service pantry. Toilets will also be provided on this floor for the patients, doctors, and nurses.

Throughout the building the walls and ceilings will be treated with a washable paint, and most of the rooms will be furnished with white tile floors, and in some rooms the walls will be finished with a white tile wainscot.

Isolation (ward) section.—The building designed during the year will be a four-story reinforced concrete cement-block structure, is T shaped in plan, with a frontage of 120 feet, and a total depth of 76 feet 6 inches.

The first story occupies the entire front portion of the building, but the hill which rises rapidly behind eliminates it from the wing. This story is especially isolated for smallpox or similar contagious diseases. In the second story are most of the private rooms, while the third and fourth stories each contain two large wards to be usually used for tubercular cases. The building contains 7 wards, 16 private rooms (each with lavatory), 1 waiting room, 4 nurses' offices, 4 doctors' rooms, 1 nurse's bedroom, 1 orderlies' dormitory, 1 mess room, 3 orderlies' workrooms, 2 messes, 3 kitchens, 3 pantries, 20 toilets with baths, 5 toilets without baths, 2 baby bathrooms; a total of 88 rooms, besides interior corridors, and a 10 by 118 foot front porch on all floors that it is intended to utilize for the accommodation of extra beds when the section is overcrowded.

The structure contains an elevator, fire protection, ice-water bubbling fountain, laundry chute, and all the plumbing conveniences for sterilizing, etc., of the other units of the hospital.

This building is located adjacent to the hospital kitchen and mess building, but a considerable lower elevation on the hillside. The passageway from the first story of the mess building connects with the isolation building at its third-story level. In design the structure will harmonize with the others of the hospital group.

RESTAURANTS.

Four restaurants were built at Cristobal, Balboa, Ancon, and at the Balboa shops during the fiscal year, all of which are practically completed, two being occupied at this date, July 21, 1917. All conform in construction and design, in finish, and in most features of equipment, but the method of service varies to accommodate the different demands of the localities patronizing them. The restaurant at Balboa shops is a branch of the Balboa restaurant and has no kitchen, the heavy cooking being all done at the latter locality and transported to the shops for the convenience of the employees there at the lunch hour (the only meal served) and rewarmed on steam tables.

All of these buildings are of the usual type of permanent construction on the Isthmus; that is, reinforced concrete floors, bearing walls and columns, and concrete block nonbearing walls. Because of the large span in the dining rooms, where columns were not desirable, steel trusses and purlins support the wood rafters and red Spanish tile roofs of all the buildings. All except the Balboa shops' restaurant are one-story structures of isolated square columns, 8 feet 10 inches between, forming the outer wall of the building and copper screened between. This makes an open pavilion of the dining room and such parts of the kitchen and other service rooms which it is not necessary to wall inclose. This pavilion style of building is, without question, the best adaptable in the Tropics for structures of uses such as these. Protection from the sun and rain is afforded by an extra projection of the roof eaves, in this case 8 feet. The finish of these buildings was decided for its sanitary value. No wood floors occur except in the offices and stewards' living rooms. Grocery storerooms and linen and equipment rooms have cement floors. The dining rooms, kitchen, bakery, refrigerating rooms, help's dining rooms, and toilets have

vitrous white mat tile floors and white enamel tile bases, the kitchen and toilets having an 8-foot high enamel tile wainscot, and the walls elsewhere being generally painted white enamel. The food counters are marble, the steam tables Monel metal, guide railings in the cafeterias are pipe brass, and copper is freely employed about the kitchen. Each restaurant, except the one at Balboa shops, has its own bakery and refrigerating plant, the one at Ancon serving the Ancon commissary in the neighborhood as well.

Cristobal restaurant.—The Cristobal restaurant is L shaped, with wings 63 feet 2 inches wide and over-all dimensions 97 feet 11 inches by 136 feet 8 inches, exclusive of oven, garbage box, and platform. The dining room is 63 feet by 97 feet 6 inches clear, inside dimensions, and has an unbroken ceiling 17 feet 2 inches high. It is located on the corner of two streets facing the Y. M. C. A. Building.

Balboa restaurant.—The Balboa restaurant has the same dimensions as the Cristobal restaurant and fronts on the south side of the Panama-La Boca road near the crossing of the Fort Grant road.

Ancon restaurant.—The Ancon restaurant is the same in dimensions as the Cristobal restaurant but one bay of 10 feet 6 inches shorter in length. It is situated on the site of the old French laundry.

Balboa shops' restaurant.—The Balboa shops' restaurant is rectangular, 62 feet 8 inches by 100 feet 8 inches, and is two stories high, the upper story being a pattern shop connected with the main pattern shop of the shops by an inclosed concrete bridge.

MUNICIPAL ENGINEERING DIVISION.

The organization of the division of municipal engineering remained unchanged during the year.

The work accomplished by the division consisted of the maintenance and repair of the municipal improvements in the Canal Zone and in the cities of Panama and Colon in the Republic of Panama, the operation of the pumping stations, the care and maintenance of the reservoirs, and the operation of the water-purification plants.

In addition to the maintenance work, the municipal division performed various items of construction work for the several divisions of The Panama Canal, as listed in the report of the municipal engineer; made the necessary surveys, plans, and estimates for all new town-site construction; a fill of 243,958 cubic yards was made for the new Cristobal town site for canal employees; water and sewer lines and streets and sidewalks were laid in this town site, the work including the construction of the sewage pumping station and the installation of the equipment; the municipal work in connection with the addition to the Balboa town site for canal employees was completed.

For the United States Army surveys were made and plans and estimates submitted, and the municipal construction work was done in the new Army posts of Fort Grant, Fort Sherman, Fort Randolph, and Fort De Lesseps, this work including the construction of tributary roads.

The details of the operations of the municipal engineering division during the fiscal year are covered in the report of the municipal engineer which follows:

MUNICIPAL ENGINEERING DIVISION.

D. E. Wright, Municipal Engineer.

The organization of the division of municipal engineering remained the same as described in the annual report for 1916, the southern district being under the supervision of Mr. W. J. Spalding, superintendent, and the northern district under the supervision of Mr. E. H. Chandler, superintendent, these districts

performing all of the maintenance and construction work, while the division of water-purification plants was continued under the supervision of Mr. George C. Bunker, physiologist.

The following is a list of the more important items of material used on construction and maintenance work by the municipal division during the fiscal year: 76,872 barrels of cement; 11,218 cubic yards of sand; 24,598 cubic yards of crushed rock; 12,735 cubic yards of screenings; 66,298 cubic yards of gravel; 784,927 feet b. m. of lumber; 441,000 pounds of reinforcing steel; 116,953 lineal feet of 6, 8, 10, 12, and 15 inch vitreous sewer pipe; 1,762 lineal feet of 20-inch concrete pipe; 5,043 lineal feet of 24-inch concrete pipe; 95,300 lineal feet of galvanized-iron pipe; 116,050 lineal feet of 4, 6, 8, 10, and 12 inch cast-iron B. & S. pipe; 4,694 barrels of fuel oil; 398 water meters, $\frac{5}{8}$, $\frac{3}{4}$, 1, 2, and 4 inch; \$1,124 worth of water-meter repair parts; 1,280 pounds of leadite; 1,474 pounds of jute; 127,686 pounds of pig lead; 135 three-way fire hydrants; 40,718 paving brick; 2,025,845 pounds of asphalt; 74,130 gallons of tarvia; 4,246 tons of coal; equipment complete for two electrically driven pump stations; 1 asphalt mixing plant, complete; 8 gasoline engine driven portable concrete mixers.

The larger portion of the above-listed material was used on the following work:

For maintenance and upkeep of the water plants, the roads, streets, and sidewalks, and the water and sewer systems in the Canal Zone a total of \$459,155.71 was spent. The following statement shows the quantity of water pumped at each of the pump stations during the year, and the average quantity per month, with the average cost per thousand gallons for pumping:

Pumping station.	Total gallons pumped during year.	Average number gallons per month.	Average cost per thousand gallons for pumping.
Mount Hope.....	1,430,034,000	119,169,500	\$0.0162
Agua Clara.....	325,017,000	27,084,750	.0411
Frijoles.....	9,482,000	790,166	.2129
Monte Lirio.....	7,889,000	657,416	.1944
Gamboa, U. S. No. 1.....	3,415,942,000	284,661,833	.0107
Miraflores, U. S. No. 2.....	361,950,000	30,162,500	.0226
Balboa, U. S. No. 3.....	2,462,055,000	205,171,250	.0102
Paraiso.....	74,642,000	6,220,166	.0620
Cucuracha (tanks).....	83,331,000	6,944,250	.....
Cucuracha (Mount Zion).....	85,002,000	7,083,500	.....
Comacho (tanks).....	51,636,117	4,303,009	.....
Comacho (into mains).....	104,169,043	8,680,753	.....

The following statement shows the division cost of water delivered in the various districts of the Canal Zone:

District.	Division cost for water delivered period ending June 30, 1917, (per thousand gallons).
Cristobal.....	0.06
Catun.....	.11
Gamboa.....	.34
Paraiso.....	.07
Pedro Miguel.....	.07
Miraflores.....	.06
Balboa-Ancon.....	.06

The municipal division received credit for the cost value of the water furnished other departments and divisions of The Panama Canal, the Panama Railroad, the Panaman Government, other departments of the United States Government, and individuals and companies, amounting in all to \$219,650 during the year.

The sale of water to vessels at the docks at Cristobal and at Balboa was handled by the municipal division. The rate charged for this water was increased, effective January 1, 1917, from 25 cents per thousand gallons to 50 cents per thousand gallons, with a minimum charge of \$3. The following

table shows the total quantity of water sold at each of the two ports in the Canal Zone, with the total number of vessels taking water during the year:

Port.	Number of vessels supplied with water.	Number of gallons water sold.
Cristobal.....	1,406	47,257,000
Balboa.....	632	14,558,000

In the cities of Panama and Colon, in the Republic of Panama, the sum of \$152,289.89 was spent for the upkeep of streets and water and sewer systems. All expense in connection with this work is repaid by water rentals, which are collected by the municipal division. The following tables show the quantity of water used in each of the two cities during the fiscal year, by quarters, together with the amount of the water rentals:

Panama water office.

CONSUMPTION PER QUARTER.

Quarter ended—	Paying connections.	Private.	Public hydrants and taps.	Total.	Daily average consumption.
		<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>
Sept. 30, 1916.....	2,407	162,565,000	71,961,000	234,526,000	2,605,000
Dec. 31, 1916.....	2,405	145,808,000	74,221,000	220,029,000	2,444,000
Mar. 31, 1917.....	2,416	149,014,000	58,928,000	207,942,000	2,310,000
June 30, 1917.....	2,423	156,086,000	45,900,000	201,986,000	2,234,000
Total for year.....		613,473,000	250,110,000	863,583,000	2,398,250

COLLECTIONS.

Quarter ended—	Amount collected from private consumers. ¹	Average consumption per private connection per quarter.	Average private quarterly bill.
		<i>Gallons.</i>	
Sept. 30, 1916.....	\$41,801.45	67,500	\$17.37
Dec. 31, 1916.....	37,193.55	60,600	15.47
Mar. 31, 1917.....	38,306.30	61,600	15.86
June 30, 1917.....	2 39,777.25	64,400	16.42
Total for year.....	157,078.55	254,100	65.12

¹ Includes all bills rendered against Panaman Government for water consumed in public buildings in Panama City, which bills have not yet been paid.

² Net amount of bills.

Report of water-collection office, Colon.

CONSUMPTION OF WATER.

Quarter ending—	Number of paying connections.	Consumption of water per quarter				Total consumption.	Average daily consumption.
		Private connections.	Panama Railroad reservation.	Panama Canal hospital and quarantine.	Public fire hydrants and taps.		
		<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>
Sept. 30, 1916.....	897	59,329,750	4,264,500	7,708,500	90,102,750	161,405,500	1,793,394
Dec. 31, 1916.....	895	55,342,250	4,321,750	10,420,000	83,850,250	153,934,250	1,710,380
Mar. 30, 1917.....	908	58,999,500	4,673,250	8,801,250	68,767,250	141,244,250	1,569,380
June 30, 1917.....	926	63,148,750	4,713,750	8,148,000	53,015,750	129,026,250	1,433,625
Total for year.....						585,610,250	1,626,695

Report of water-collection office, Colon—Continued.

WATER RENTAL COLLECTIONS.

Quarter ending—	Amount collected from private consumers.	Amount collected from Panama Railroad.	Amount collected from Panama Canal.	Amount paid or to be paid by the Panama Government.	Total revenue per quarter.	Average consumption per quarter per connection.	Average private quarterly bill.	Average cost per per hydrant.
						Gallons.		
Sept. 30, 1916.....	\$23,992.60	\$1,279.50	\$2,312.70	\$3,783.78	\$27,584.80	66,142	\$26.74	\$33.28
Dec. 31, 1916.....	22,364.25	1,298.10	3,126.30	3,208.99	26,788.65	61,628	24.90	28.15
Mar. 31, 1917.....	23,912.25	1,402.80	2,641.80	2,613.41	27,956.85	64,977	26.33	22.92
June 30, 1917.....	25,487.30	1,415.40	2,446.50	.....	29,349.20	68,195	27.52	.....
Total for year.	95,756.40	5,395.80	10,527.30	.....	.....	.....	105.49	.....

The following statement shows the status of the capital cost account for the municipal improvements in the cities of Panama and Colon at the close of the fiscal year. This statement also shows the status of the account on July 1, 1910, with detail of the debits and credits each year since that date according to the agreement of September 30, 1910, with the Republic of Panama, under authority of which quarterly statements of the account are made.

Status of capital-cost account for municipal improvements in Panama and Colon.

	Panama.	Colon.
Cost of original water and sewer system within city prior to July 1, 1910..	\$504,911.57	\$314,760.99
Cost of original pavements within city prior to July 1, 1910.....	447,966.60	221,070.29
Cost of extensions to water and sewer system within city prior to July 1, 1910.....	122,165.92	169,581.52
Cost of extensions to pavements prior to July 1, 1910.....	92,193.08	88,967.20
Interest on capital cost water and sewer systems and pavements prior to July 1, 1910.....	77,742.27	48,314.47
Proportion interest on capital cost reservoirs, pumping stations, and pipe lines prior to July 1, 1910.....	6,216.66	6,125.16
Cost of maintenance water and sewer systems and pavements prior to July 1, 1910.....	93,625.14	107,154.78
Proportion cost of maintenance reservoirs, pumping stations, and pipe lines prior to July 1, 1910.....	5,992.04	19,681.51
Water rental collections prior to July 1, 1910.....	212,375.20	200,410.74
Capital cost water and sewer system and pavements July 1, 1917.....	¹ 1,020,852.53	¹ 1,047,553.73
Capital cost reservoirs, pipe lines, pump stations, and filter plants in Zone July 1, 1917.....	¹ 1,765,222.58	¹ 585,642.89

¹ Panaman Government pays a proportion of interest on these sums at 2 per cent based on relation of total quantity of water used in Panama and Colon to total quantity of water produced by system.

PANAMA.

Fiscal year ending—	New construction in city.	Maintenance work.	Interest.	Applied in amortization of capital cost.	Water rentals, including deficiencies.
June 30, 1911.....	\$54,609.74	\$30,121.03	\$25,703.95	\$26,611.99	\$82,436.97
June 30, 1912.....	38,745.05	35,563.86	26,587.60	31,651.54	93,803.00
June 30, 1913.....	¹ 1,815.77	38,470.70	27,468.14	48,937.71	114,876.55
June 30, 1914.....	1,505.37	104,469.25	29,086.29	32,648.88	166,204.42
June 30, 1915.....	5,034.13	88,414.68	26,992.07	25,247.78	140,654.53
June 30, 1916.....	.....	84,543.88	32,094.21	25,283.10	141,921.19
June 30, 1917.....	.....	97,744.09	30,404.15	25,283.07	153,430.31
Total for period.....	98,078.52	479,327.49	198,335.41	215,664.07	893,326.97

¹ Indicates credit by adjustment.

Status of capital-cost account for municipal improvements in Panama and Colon—Continued.

COLON.

Fiscal year ending—	New construction in city.	Maintenance work.	Interest.	Applied in amortization of capital cost.	Water rentals, including deficiencies.
June 30, 1911.....	\$188,114.24	\$43,111.09	\$19,028.64	\$18,019.80	\$80,159.53
June 30, 1912.....	84,528.41	54,470.85	21,786.98	20,994.40	97,252.23
June 30, 1913.....	88,071.07	51,161.60	24,101.66	23,553.23	98,816.49
June 30, 1914.....	14,302.97	68,869.80	26,433.88	21,388.65	119,692.33
June 30, 1915.....	1,413.33	67,263.30	26,771.51	24,513.22	118,548.06
June 30, 1916.....	1,908.82	85,171.60	26,256.02	24,569.28	135,996.90
June 30, 1917.....	54,876.54	69,747.91	25,062.22	24,868.25	19,678.38
Total for period.....	433,215.38	439,796.15	169,440.94	160,906.83	770,143.92

Under the head of new construction for the municipal division in the towns and villages occupied by Panama Canal employees in the Canal Zone a total of \$488,948.81 was spent. The principal items of construction under this heading were the grading of grounds and the installation of water and sewer lines and streets and sidewalks in the new addition to the town of Balboa; making the fill and grading grounds and constructing water and sewer systems and streets and sidewalks in the new town of Cristobal; construction of roads in outlying districts; the renewal of the water distribution system in the town of Gatun; and the placing of sidewalks in a number of places in the older town sites.

Under the head of work for other divisions the following sums were expended, and the more important items of work under this heading were as listed below:

United States Army.—In the construction of new posts \$489,350.70 were expended. This work consisted in main of the grading, putting in water and sewer systems, the construction of streets and sidewalks at Forts Grant, Sherman, and Randolph, the construction of concrete road from Fort Randolph to Mount Hope and from Fort Grant to Balboa.

The Panama Railroad.—The sum of \$126,849.40 was spent. The principal items of construction under this heading were the construction of the G Street storm sewer in Colon, the construction of a part of the Curundu River storm sewer, the construction of streets to and around the Cristobal piers, the installation of water lines for cattle pastures, and the construction of roads to a number of the plantations; construction of concrete road to the new laundry in Ancon; the improvements to the swimming pool at the Washington Hotel; improvement to the pavements in the vicinity of the passenger station in Panama City, and various other miscellaneous construction jobs.

Other departments of the United States Government.—The total amount spent was \$41,562, and the principal items of work under this charge were the construction of the roads, streets, and water and sewer lines to the new ordnance depot at Corozal and repairs to roads and streets in the camps at Culebra, Empire, Las Cascadas, and Quarry Heights.

Outsiders.—The total expenditure was \$15,623.90. The work done consisted principally of that for which deposits were made and included the making of private water taps and the construction of short sections of road, repairs to the tramway company right of way in Panama City, and repairs to streets that were opened up for the gas company in Panama and Colon.

Terminals.—A total of \$88,662 was spent on terminal construction work which consisted mainly of the construction of the quay wall at Balboa, the rat proofing of Piers Nos. 15 and 16, construction of retaining walls for Pier No. 18, the riprapping and grouting of banks in rear of Docks Nos. 17 and 19, the installation of fender piles at the Balboa coal-handling plant, the grouting and riprapping of banks in the vicinity of same, the extension of oil lines for the delivery of oil at the coal-handling plant, extension of water lines on the piers, and the grading and asphaltting of areas in the shops' district, Balboa.

The building division.—A total of \$68,622 was spent: the work done consisted of the installation of water and sewer connections for new buildings constructed, the erection of clotheslines for new quarters, the preparing of building sites, the

installation of water line to the new ice and cold-storage plant in Balboa, the construction of road in the rear of the Colon Hospital, and various other miscellaneous jobs of work.

The health department.—The sum of \$75,894 was spent for the health department on work requests, and the work done consisted of filling and draining the swamp areas in the vicinity of Mount Hope, the grading and drainage of areas in the vicinity of Balboa, the construction of concrete drains for areas in Balboa, Ancon, Corozal, Pedro Miguel, Paraiso, Gatun, and Colon. In addition to doing all new construction work, old sanitary ditches were resurfaced and maintained.

Miscellaneous.—For the divisions of fortifications, clubs and playgrounds, locks, electrical, marine, dredging, mechanical, and supply, there was a total of \$45,510 spent. The work done consisted of miscellaneous construction jobs, and included the construction of spillway for the Rio Grande River, special roads, the driving of wells, extension of pipe lines, miscellaneous concreting work, the installation of various playground apparatus, construction of tennis courts, etc.

During the year a total of 155,137 square yards of concrete streets and roads were constructed, and 59,916 square yards of asphaltic streets and roads built, this asphalt being placed on macadam and Telford foundations; 12,046 square yards of macadam roads were constructed with Tarvia binder; making a total of 227,099 square yards of roads and streets constructed during the year. No new waterbound macadam roads were constructed, due to the fact that the maintenance and upkeep of this class of road is out of all proportion to the difference in cost between this and either concrete or asphalt construction. The average maintenance cost of old macadam roads in the Canal Zone during the year amounted to 25 cents per square yard, and it has been found from the records kept of the cost of maintenance of this class of road that the original cost of construction plus maintenance cost in keeping a macadam road in good serviceable condition for a period of nine years amounts to twice the cost of construction of a concrete road. The extremely heavy rains during the rainy season and the high winds and lack of moisture during the dry season accounts for the above.

The total cost of the work performed by the municipal division during the fiscal year, including labor and material and charges from other divisions and departments of The Panama Canal, was \$2,203,878.91.

The following is a summary of the report of the work performed in connection with the operation of the water-purification plants during the year.

Summary.

	Agua Clara.	Mount Hope.	Miraflores.
Placed in service.....	Dec. 29, 1911.....	Feb. 23, 1914.....	Mar. 14, 1915.
District supplied.....	Gatun, Toro Point	Colon, Cristobal, Mount Hope, Margarita Point.	Paraiso, Pedro Miguel, Corozal, Balboa, Ancon, Panama.
Source of supply.....	Agua Clara Reser- voir.	Brazos Brook Res- ervoir.	Chagres River.
Rated capacity, gallons per day	2,500,000.	8,000,000.	15,000,000.
Method of purification.....	Aeration, sedimen- tation, rapid sand filtration.	Aeration, sedimen- tation, rapid sand filtration.	Aeration, sedimen- tation, rapid sand filtration.
Aeration basin:			
Size, feet.....	4 by 8 ¹	60 by 66.....	86 by 130.
Number of nozzles.....		85.....	105.
Sedimentation basin:			
Size, feet.....	70.5 by 71.....	171 by 171.....	300 by 125.
Depth, feet.....	10.5.....	12.25.....	16.5.
Capacity, gallons.....	350,000.....	2,500,000.....	4,500,000.
Period of sedimentation, hours.....	10.....	14.....	12.
Rapid sand filters:			
Number of units.....	4.....	6.....	14.
Total sand area, square feet.....	1,156.....	3,078.....	5,950.
Depths of filtering materials—			
Sand, inches.....	30.....	30.....	30.
Gravel, inches.....	24.....	22.....	24.
Size of filtering materials—			
Sand, effective size.....	0.44.....	0.41.....	0.41.
Sand, uniformity coefficient.....	1.81.....	1.70.....	1.70.
Gravel, size, inches.....	$\frac{1}{8}$ to $\frac{1}{4}$	$\frac{1}{8}$ to $\frac{1}{4}$	$\frac{1}{8}$ to $\frac{1}{4}$.
Per cent of sand area covered by horizontal area of troughs.....	22.3.....	32.0.....	32.8.

¹ Aerator box.

Summary—Continued.

	Agua Clara.	Mount Hope.	Miraflores.
Rapid sand filters—Continued.			
Size of filtering materials—Continued.			
Washing of filters—			
Vertical rise per minute, inches.	19.....	20.....	24.
Gallons per square foot of sand surface.	12.....	12.5.....	15.
Filter bottom, type.....	Harrisburg, Pa.....	Harrisburg, Pa.....	Concrete false bottom.
Loss of head—			
Average initial, feet.....	0.6.....	1.3.....	1.0.
Average final, feet.....	7.5.....	12.5.....	11.5.
Length of filter runs, hours, yearly average.	30.0.....	27.8.....	38.0.
Volumes of water, average gallons per day:			
Raw.....	920,000.....	4,220,000.....	8,452,000.
Filtered.....	890,000.....	4,034,000.....	8,383,000.
Delivered to mains.....	865,000.....	3,898,000.....	8,211,000.
Wash water.....	25,000.....	135,800.....	172,100.
Per cent of filtered water.....	2.8.....	3.4.....	2.0.
Chemicals, yearly averages:			
Alum, pounds per million gallons.....	220.....	163.....	179.
Lime, pounds per million gallons.....	95.....	.....	.....
Liquid chlorine, parts per million, available chlorine.....	.....	0.19.....	0.34.
Physical and chemical characteristics of filtered water, parts per million:			
Color.....	7.....	6.....	1.
Turbidity.....	0.....	0.....	0.
Free carbonic acid (CO ₂).....	2.41.....	3.5.....	5.0.
Carbon dioxide as carbonate (CO ₂).....	2.5 ².....	.....	0.
Alkalinity, erythrosine (CaCO ₃).....	19.0.....	30.0.....	45.0.
Hardness, soap (CaCO ₃).....	28.....	34.....	46.
Oxygen consumed.....	1.6.....	1.5.....	0.5.
Chlorine (Cl).....	6.3.....	6.0.....	7.0.
Iron (Fe).....	0.20.....	0.06.....	0.05.
Solids, total.....	95.....	88.....	103.
Nitrogen as—			
Nitrites (NO ₂).....	0.0020.....	0.0000.....	0.0018.
Nitrites (NO ₃).....	0.015.....	Trace.....	0.014.
Colonies of bacteria per c. c. in water from distribution system:			
Nutrient agar at 37.5° C., 24 hours.....	297.....	429.....	111.
B. coli index, number per liter.....	30.....	190.....	75.

¹ Average, July 1, 1916, to Oct. 31, 1917, inclusive.² Average, Dec. 1, 1916, to June 30, 1917, inclusive.

SECTION OF METEOROLOGY AND HYDROGRAPHY.

The section of meteorology and hydrography continued to keep the permanent records of weather conditions on the Canal Zone, the hydrology of Gatun Lake watershed, including the operation of the spillway, and the hydrographic conditions at the Atlantic and Pacific approaches of the canal and at the locks.

The rainfall of the year was generally above the normal over the Pacific section and the southern part of the Central section, while over the northern part of the Central section and the whole of the Atlantic section, there was a marked deficiency of rainfall.

The yield of the Gatun Lake watershed for the year 1916 was 10 per cent above the six-year normal, or 6,684 cubic feet per second, against a normal of 6,092 cubic feet per second. The yield of the Gatun Lake watershed for the dry season, 1917—January to April, inclusive—was 35 per cent below the seven-year dry season normal, or 1,348 cubic feet per second, against an average yield of 2,076 cubic feet per second. Only once since the formation of Gatun Lake

has the yield been below that of 1917, which was in 1912, when the yield was 892 cubic feet per second.

The details of the work accomplished by this section are covered by the report of the chief hydrographer, which follows:

SECTION OF METEOROLOGY AND HYDROGRAPHY.

F. D. Willson, Chief Hydrographer.

The personnel of the section has remained unchanged, with the exception that Mr. R. L. Mitchell succeeded Mr. R. Z. Kirkpatrick, transferred to the Navy Department, Washington, D. C., as assistant chief hydrographer.

Few changes were made during the year in the stations operated under the direction of the chief hydrographer. All of the stations enumerated in the annual report of 1915-16 were continued in operation.

At the request of the marine superintendent an automatic wind-velocity instrument was installed at the signal station on Sosa Hill and an anemometer and rain gauge at Cape Mala.

The Colon meteorological office was moved from the old Panama Railroad office building to a permanent location in the Atlantic terminal building. Records were obtained pending the erection of a new steel tower from instruments installed on the roof of the Washington Hotel. Records were begun at the new location March 1, 1917.

The temporary structures for water stage registers at Juan Mina, Vigia, Frijoles, and Trinidad were replaced by permanent ones of steel and concrete during the dry season of 1917.

At the request of the engineer in charge of coast defense an automatic tide register was installed on Morro Island in Panama Bay.

The hydrographic work for the Navy Department formerly handled by the captain of the port was turned over to this division by order of the Governor on November 4, 1916. The duties are to be performed and reports rendered through the captain of the port.

A special investigation of the currents around the new coal-handling plant at Cristobal, the old French Canal, and the East Diversion was made at the request of the marine superintendent and copies furnished to the hydrographic bureau of the Navy Department and to the superintendent of the Coast and Geodetic Survey.

Climatological and hydrographic data were furnished the various divisions of The Panama Canal and Panama Railroad, as requested, during the year.

Arrangements were made with the United States Weather Bureau, Washington, to furnish 8 a. m. and 8 p. m. meteorological reports from June 1 to December 1.

Regular weather forecasts are received each day at 2 p. m. for the Caribbean Sea, Gulf of Mexico, and South Atlantic Ocean, and given the widest publicity. Special hurricane reports are received during the hurricane season and are furnished to all shipping and allied interests. The collection and distribution of ocean meteorological and hydrographic data has been continued during the year, as has also the comparison of meteorological and navigational instruments for the shipping interests using The Panama Canal. No "northers" or other destructive storms occurred during the dry season of 1917.

METEOROLOGY.

Precipitation.—The rainfall for the calendar year 1916 was generally above the normal over the Pacific section, and the southern part of the Central section, while over the northern part of the Central section and the whole Atlantic section there was a marked deficiency of rainfall. The annual totals ranged from 119.13 inches at the Chillibrillo station to 75.06 inches at Balboa. The average precipitation over the Pacific section was 83.60 inches; 96.01 inches over the Central section; and 105.29 inches over the Atlantic section.

The 1916 dry season rainfall over the Pacific section amounted to 11 per cent of the annual total; 10 per cent over the Central section; and 12 per cent over the Atlantic section. March was the month of least rainfall, and October and November were the months of greatest rainfall.

The maximum 24-hour rainfall recorded during the year was 8.17 inches at Brazos Brook on November 16 and 17. Daily quantities in excess of 4 inches were recorded as follows:

Station.	Date.	Inches.	Station.	Date.	Inches.
Balboa.....	May 26	5.42	Trinidad.....	Nov. 17	4.77
Balboa Heights.....	do	4.70	Monte Lirio.....	do	7.60
Miraflores.....	Aug. 14	4.21	Gatun.....	do	4.13
Alhajuela.....	July 5	4.06	Brazos Brook.....	do	8.17
Vigia.....	Sept. 22	4.73	Colon.....	do	6.25

The rainfall during the first six months of 1917 has been below normal throughout the Zone.

Monthly records for 1916, 1917, and the station averages, are represented in Table No. 1, while the maximum rainfall of record for periods of 5 minutes, 1 hour, and 24 hours at stations equipped with automatic registers are shown in Table No. 2.

Temperature.—The average air temperature for the year 1916 was approximately 1° F. above normal on the Atlantic coast, and 1° F. below normal on the Pacific coast. April was the month of highest mean temperature on both coasts, while October was the month of lowest mean temperature on the Pacific coast, and December on the Atlantic.

The means and extremes in air temperature for the year 1916 at the two first-class stations are given in the following table:

Station.	Maximum.		Minimum.		Annual mean.
	°F.	Date.	°F.	Date.	°F.
Balboa Heights.....	92	Apr. 5	68	Feb. 5	79.3
Colon.....	90	May 11	72	May 27	80.6

The absolute maximum and minimum temperature for the years of record are shown below revised to June 30, 1917:

Station.	Maximum.		Minimum.	
	°F.	Date.	°F.	Date.
Balboa Heights.....	97	Apr. 7, 1912	63	Jan. 27, 1910
Colon.....	92	June 3, 1909	66	Dec. 3, 1909

The lowest temperature of record on the Isthmus is 58° F., recorded at Alhajuela on March 25, 1917. The temperature of 59° F., recorded at Bas Obispo on February 9, 1907, was the record low temperature previous to this reading. The maximum temperature record of 97° F. at Balboa Heights (then Ancon) was equaled at the Naos Island station on February 13, 1906.

The temperature during the first six months of 1917 has been below normal on both coasts.

Monthly temperature records and other meteorological data for the year 1916 at the two first-class stations are presented in Tables Nos. 3 and 4.

Wind.—The wind movement over the Canal Zone for the year 1916 was slightly below the average. Northerly winds prevailed on the Pacific coast, while on the Atlantic coast southeast winds predominated. February was the month of greatest wind movement and July the month of least movement.

The following table revised to June 30, 1917, shows the maximum wind velocities of record at the first-class stations:

Station.	Maximum velocity.		Date.
	Miles per hour.	Direction.	
Balboa Heights.....	59	South.	July 10, 1909
Colon.....	46	North.	Apr. 4, 1915

Atmospheric pressure.—The mean atmospheric pressure for the year 1916 was slightly above the normal. February was the month of highest mean pressure and June the month of lowest mean pressure on both coasts.

Relative humidity.—The mean relative humidity of the atmosphere for the year 1916 was slightly above the average. March was the month of lowest average humidity on both coasts, while the month of highest average humidity was June on the Atlantic coast and November on the Pacific.

Cloudiness.—The average daytime cloudiness for the year 1916 was slightly above normal over both coasts. June and September were the cloudiest months, while the least average cloudiness occurred in January and February.

Evaporation.—The evaporation during the year 1916 was nearly normal over the Pacific coast and the lake surface at Gatun, but slightly below normal over the Atlantic coast. Evaporation during the first six months of 1917 has been above normal over both coasts and slightly below normal over the Gatun Lake area.

The monthly records are given in table No. 5. The total evaporation for the year 1916, together with the station averages, are presented in the following table:

Station.	Evaporation (inches).		Years of record.
	1916	Average.	
Balboa Heights.....	50.354	50.783	9
Gatun.....	61.558	61.481	6
Colon.....	51.447	52.416	8½

Fogs.—No fogs were observed on either coast during the year, but a number of fogs occurred at interior stations where fog records are kept. Practically all fogs observed lifted or were dissipated by 8.30 a. m.

Sea temperature.—The surface temperature of the sea was slightly below normal on the Pacific coast and slightly above normal on the Atlantic. The means and extremes for the year 1916 are given in the following table:

Station.	Maximum.		Minimum.		Annual mean.
	°F.	Date.	°F.	Date.	
Balboa.....	86	May 16	60	Feb. 14	79.6
Colon.....	86	Apr. 26 ¹	78	Feb. 6 ¹	82.6

¹ On other dates also.

Tidal conditions.—Tide registers were continued in operation at Balboa and Colon. The tidal extremes for the years of record at these stations are given below (length of record, 9 years), table revised to June 30, 1917:

Station.	Maximum high water.		Extreme low water.		Maximum daily range. ¹		Minimum daily range. ¹	
	Elevation.	Date.	Elevation.	Date.	Feet.	Date.	Feet.	Date.
Balboa....	11.2	Oct. 2, 1909	-10.9	{Feb. 5, 1916 Feb. 23, 1917	20.9	Feb. 23, 1917	4.9	Feb. 24, 1915
Colon....	1.68	Feb. 11, 1915	-1.01	{June 9, 1910 June 9, 1910	2.17	Feb. 28, 1911	.....	(?)

¹ For consecutive tides.

² One tidal fluctuation often entirely absent at Colon.

Seismology.—Thirty-two seismic tremors were recorded at the Balboa Heights seismological station during the fiscal year ending June 30, 1917, five of which had a maximum amplitude of 20 millimeters or more. Twenty-five of the shocks

were of comparative local origin, the epicenters ranging in distance from 70 to 760 miles, while the remaining seven were of distant origin, ranging from 1,045 to 4,950 miles. The intensities of the various shocks varied from I to IV on the Rossi-Foré scale of I to X.

A complete list of seismic disturbances recorded at Balboa Heights during the fiscal year of 1916-17 is given in Table No. 7.

The following tables accompany this report:

- No. 1. Monthly rainfall on the Isthmus of Panama.
- No. 2. Maximum rainfall in the Canal Zone.
- No. 3. Monthly meteorological data, Balboa Heights, year 1916.
- No. 4. Monthly meteorological data, Colon, year 1916.
- No. 5. Monthly evaporation, Canal Zone, 1916, 1917, and averages.
- No. 6. Tidal conditions, year 1916.
- No. 7. Seismograph records, Balboa Heights, fiscal year 1916-17.

TABLE NO. 1.—*Monthly rainfall on Isthmus of Panama, 1916-17, and station averages.*

[Value in inches.]

Stations.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Balboa:													
1916.....	1.15	1.46	0.43	3.06	12.64	3.95	9.79	11.69	6.97	10.86	8.12	4.94	75.06
1917.....	.31	.19	T.	2.03	4.98	8.14							
Average, 18 years	1.11	.69	.67	3.87	8.46	7.39	8.20	7.91	6.80	9.56	9.13	5.79	69.53
Balboa Heights:													
1916.....	1.41	1.48	.89	2.84	12.59	4.39	10.13	10.53	8.02	10.17	8.77	5.86	77.08
1917.....	.13	.19	.02	2.24	5.75	7.35							
Average, 19 years	1.04	.92	.68	2.87	8.89	7.63	7.84	8.03	7.60	10.51	10.20	4.47	70.68
Miraflores:													
1916.....	2.19	.59	.20	8.27	11.10	5.62	8.88	10.52	5.33	14.27	9.55	6.36	82.93
1917.....	.37	.28	.48	1.10	6.81	11.23							
Average, 8 years	1.89	1.36	.48	3.72	10.58	8.69	8.00	8.82	8.87	12.77	11.01	7.12	83.31
Pedro Miguel:													
1916.....	1.71	.86	.41	9.82	13.10	6.42	9.17	9.78	10.43	15.72	13.39	4.85	95.66
1917.....	.30	T.	.91	1.25	7.38	11.34							
Average, 9 years	1.12	.90	.32	3.82	11.44	9.55	8.59	8.43	8.67	12.62	10.81	5.98	82.45
Rio Grande:													
1916.....	.68	1.12	.83	5.23	11.22	8.67	8.10	6.34	10.22	15.30	14.05	5.52	87.28
1917.....		.04	.17	1.85	6.98	11.45							
Average, 12 years	1.27	.83	.33	3.23	10.91	9.11	9.85	9.65	10.49	12.74	10.82	5.55	84.78
Culebra:													
1916.....	1.30	1.61	.56	5.66	10.91	7.56	8.84	5.05	10.42	14.52	17.04	5.55	89.02
1917.....		.09	.03	1.91	7.17	9.89							
Average, 26 years	1.65	.71	.62	3.63	11.10	8.83	9.31	10.26	10.68	11.45	12.27	7.18	87.69
Comacho:													
1916.....	1.42	1.36	.62	4.02	10.93	7.12	9.91	6.62	10.57	13.84	15.07	5.35	86.83
1917.....		.22		1.57	6.59	12.33							
Average, 10 years	1.13	1.05	.50	3.27	11.70	9.40	9.61	9.70	10.45	13.47	12.75	5.79	88.82
Empire:													
1916.....	1.07	1.49	.84	4.05	9.92	7.03	7.86	5.66	9.21	14.29	16.58	5.11	83.11
1917.....	.01	.08	.01	2.40	8.07	12.24							
Average, 12 years	.81	.90	.39	3.24	10.01	8.38	8.71	9.49	8.54	13.28	11.28	5.11	80.14
Gamboia:													
1916.....	2.16	1.52	.89	6.68	12.25	8.44	9.59	12.22	11.37	13.46	9.84	4.75	93.17
1917.....	.09	.30	.26	3.96	8.14	7.82							
Average, 34 years	1.78	.90	.76	3.60	10.89	9.82	10.10	11.97	10.51	12.70	12.00	6.73	91.76
Juan Mina:													
1916.....	1.46	2.56	.88	8.12	9.46	6.91	10.27	12.81	14.59	20.39	12.94	3.82	104.21
1917.....	.04	.08	.21	2.31	12.34	9.45							
Average, 6 years	.69	1.60	.29	3.47	10.79	11.00	9.82	11.45	11.96	15.00	12.52	5.00	93.59
Alhajuela:													
1916.....	.66	1.34	.37	5.84	12.40	14.00	12.05	10.98	14.96	19.31	14.77	3.29	109.97
1917.....	.11	.04	.17	1.09	17.17	8.70							
Average, 17 years	1.09	.86	.54	3.47	12.00	12.55	12.62	12.66	11.82	14.14	14.46	6.23	102.44
Vigia:													
1916.....	.22	1.33	.42	8.17	12.41	13.53	12.05	11.60	20.64	17.85	12.26	3.36	113.84
1917.....	.13	.17	.02	.67	15.09	9.66							
Average, 8 years	.82	2.02	.51	3.30	11.69	13.72	12.04	12.59	13.39	16.41	14.95	5.10	106.54
Frijoles:													
1916.....	1.32	3.48	2.01	3.55	8.45	8.02	7.23	7.63	6.65	13.88	12.02	3.82	78.06
1917.....	.17	.15	.27	4.14	7.37	10.04							
Average, 5 years	2.06	3.30	.70	4.34	12.97	10.72	9.56	10.66	10.12	16.56	14.84	5.56	101.39
Trinidad:													
1916.....	2.03	2.81	2.77	4.93	12.09	7.50	13.26	10.37	8.57	17.60	13.66	3.16	98.75
1917.....	.58	.45	.47	4.18	11.64	9.45							
Average, 9 years	2.90	3.21	2.40	5.10	13.59	10.75	9.47	10.39	11.78	14.85	17.81	8.60	110.85
Monte Lirio:													
1916.....	.75	2.60	2.66	4.73	8.41	11.81	9.64	10.50	9.88	17.29	18.42	6.49	103.18
1917.....	.68	.55	.75	3.81	11.24	14.50							
Average, 9 years	2.86	3.89	2.67	5.48	13.22	12.84	12.03	11.77	12.76	16.79	21.59	9.54	125.44
Gatun:													
1916.....	1.05	2.13	3.25	4.72	11.32	10.60	9.68	5.97	8.24	16.37	19.15	4.21	96.69
1917.....	1.11	.62	.52	9.84	15.14	12.41							
Average, 12 years	3.31	3.21	2.45	5.14	14.57	13.01	11.78	13.75	10.24	16.51	20.42	10.93	125.32
Brazos Brook:													
1916.....	1.50	3.62	2.75	4.99	14.23	13.21	11.44	6.42	13.03	18.14	21.49	4.92	115.74
1917.....	1.28	1.11	.61	6.23	15.86	12.33							
Average, 10 years	3.22	3.69	2.50	4.87	13.16	15.30	15.70	13.85	12.16	16.63	22.84	11.89	135.81
Colon:													
1916.....	2.33	1.96	2.68	6.25	9.38	14.28	10.44	8.34	10.41	17.59	14.08	5.71	103.45
1917.....	1.10	.45	.76	1.87	12.11	14.37							
Average, 46 years	3.92	1.72	1.66	4.23	12.58	13.46	16.19	14.90	12.51	14.78	21.51	11.91	129.37

NOTE.—Station averages do not include records for the year 1917.

TABLE NO. 2.—Maximum rainfall in Canal Zone, Oct. 1, 1905, to June 30, 1917.

[Value in inches.]

Stations.	Maximum rainfall.					
	5 minutes.		1 hour.		24 hours. ¹	
	Inches.	Date.	Inches.	Date.	Inches.	Date.
Balboa (June 10, 1906).....	0.90	May 12, 1912	5.86	June 2, 1906	7.57	Nov. 16-17, 1906.
Balboa Heights (Oct. 1, 1905) ²	.64	Aug. 7, 1908	3.98	Oct. 9, 1911	7.23	May 12-13, 1912.
Miraflores (June 19, 1914).....	.45	Jan. 5, 1915	2.66	Aug. 14, 1916	4.70	Nov. 11, 1912. ³
Pedro Miguel (Jan. 1, 1908).....	.60	Nov. 11, 1908	2.30	Aug. 27, 1908	4.64	May 25-26, 1914.
Rio Grande (Dec. 29, 1905).....	.75	July 24, 1908	3.10	Sept. 21, 1912	6.00	Dec. 2-3, 1906.
Culebra (July 1, 1906) ⁴.....	.64	May 2, 1908	3.69	Oct. 16, 1907	5.55	Dec. 3, 1906. ⁵
Empire (July 18, 1906).....	.60	July 25, 1906	3.63	Oct. 1, 1909	6.15	Dec. 3, 1906. ⁵
Gamboa (Nov. 18, 1905).....	.59	July 27, 1908	3.32	May 11, 1911	6.56	Dec. 2-3, 1906.
Alhajuela (Mar. 31, 1907).....	.60	July 20, 1909	4.19	July 8, 1915	8.19	Dec. 2-3, 1906. ⁵
Frijoles (June 26, 1913).....	.54	July 23, 1915	2.81	July 21, 1915	6.73	Apr. 3-4, 1915.
Gatun (Aug. 24, 1907).....	.62	{ Aug. 3, 1912 Aug. 12, 1914 }	4.72	Aug. 12, 1914	10.48	Dec. 3, 1906. ⁵
Colon (Oct. 1, 1905).....	.64	Aug. 25, 1909	4.90	Oct. 8, 1909	8.53	Dec. 2-3, 1906.
Porto Bello (May 1, 1908) ⁶	⁷ 2.48	Nov. 29, 1911	4.53	Nov. 29, 1911	10.86	Dec. 28-29, 1909.
Bohio (Oct. 1, 1905) ⁸.....	.67	June 16, 1909	4.51	Aug. 7, 1908	8.85	Aug. 7-8, 1908.

¹ Maximum fall in any 24 consecutive hours.² Formerly Ancon. Station moved to Balboa Heights Oct. 1, 1914.³ From standard gauge reading.⁴ Automatic gauge discontinued June 28, 1915.⁵ No automatic record on this date, total for 24 hours ending at noon.⁶ Automatic gauge discontinued May 9, 1914—station closed Aug. 31, 1914.⁷ Approximate: Automatic record indistinct, due to unusually excessive rate of fall.⁸ Station closed January, 1912.

NOTE.—Dates in parentheses opposite station names refer to installation of automatic register.

TABLE NO. 3.—*Monthly meteorological data, year 1916, Balboa Heights, Canal Zone.*¹

Month.	Atmospheric pressure (inches).		Air temperature (° F.).							Maximum daily range.	Mean wet thermometer.	Mean temperature dew point.	Mean relative humidity.
	Station. ²	Sea level.	Monthly mean.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.				
January.....	29.746	29.868	80.3	90	5	88.1	68	28	72.5	22	73	72	87
February.....	29.768	29.890	79.0	90	6	87.0	68	5	71.1	22	72	70	84
March.....	29.756	29.878	80.4	91	13	88.8	69	6	72.0	20	73	71	81
April.....	29.734	29.852	81.2	92	5	88.8	69	1	73.5	20	74	73	83
May.....	29.719	29.841	79.8	91	12	85.7	69	27	73.9	16	76	75	89
June.....	29.708	29.830	79.2	89	16	84.7	72	10	73.6	16	75	74	91
July.....	29.744	29.866	78.5	90	13	84.2	70	11	72.7	17	75	74	91
August.....	29.764	29.886	78.1	89	12	83.3	70	7	72.9	15	74	73	91
September.....	29.738	29.860	79.4	90	13	85.4	71	17	73.3	18	75	74	91
October.....	29.739	29.861	78.0	86	18	82.8	71	22	73.2	13	74	73	91
November.....	29.735	29.856	78.1	89	27	83.8	69	2	72.3	17	74	73	92
December.....	29.722	29.844	79.1	89	5	86.2	70	11	72.0	18	74	73	91
Year.....	29.739	29.861	79.3	92	35	85.7	68	45	72.8	22	74	72.9	88.6

Month.	Precipitation (inches).			Wind.					Number of days.				
	Monthly total.	Normal. ³	Rainy days.	Total movement (miles).	Prevailing direction.	Maximum velocity.			Clear.	Partly cloudy.	Cloudy.	Thunderstorms.	Average cloudiness. ⁶
						Miles per hour.	Direction.	Date.					
January.....	1.41	1.04	11	5,488	N.	25	N.	9	5	21	5	2	5.8
February.....	1.48	.92	8	7,934	NW.	30	N.	4	4	19	6	0	5.8
March.....	.89	.68	6	7,478	NW.	32	N.	17	0	27	4	0	6.1
April.....	2.84	2.87	14	5,432	NW.	27	N.	10	4	10	16	12	6.9
May.....	12.59	8.89	20	4,610	NW.	31	NE.	25	1	9	21	13	8.2
June.....	4.39	7.63	23	5,012	N.	34	SW.	28	0	3	27	12	8.8
July.....	10.13	7.84	23	3,896	N.	30	SW.	28	0	13	18	14	7.8
August.....	10.53	8.03	23	5,008	S.	36	S.	28	0	7	24	11	8.3
September.....	8.02	7.60	21	4,297	NW.	29	NE.	16	0	7	23	15	8.2
October.....	10.17	10.51	23	6,283	S.	33	S.	10	0	2	29	15	8.7
November.....	8.77	10.20	25	4,483	S.	30	S.	13	0	9	21	10	7.9
December.....	5.86	4.47	14	4,609	NW.	21	N.	24	2	24	5	1	5.9
Year.....	77.88	70.68	211	64,440	NW.	36	S.	728	16	151	199	105	7.4

¹ Station formerly Ancon. Moved to Balboa Heights, Oct. 1, 1914.² Elevation of barometer 118 feet above sea level.³ April.⁴ February.⁵ Average for 19 years' record.⁶ Tenths of sky.⁷ August.

TABLE No. 4.—*Monthly meteorological data, year 1916, Colon, Republic of Panama.*¹

Month.	Atmospheric pressure (inches).		Air temperature (° F.).							Maximum daily range.	Mean wet thermometer.	Mean temperature dew point.	Mean relative humidity.
	Station. ²	Sea level.	Monthly mean.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.				
January	29.854	29.880	81.0	86	9	84.8	74	29	77.3	11	76	75	86
February	29.882	29.908	79.8	85	29	83.8	73	18	75.9	11	75	73	84
March	29.869	29.895	80.5	86	27	84.6	74	10	76.4	11	75	74	83
April	29.836	29.862	81.8	89	27	86.3	73	1	77.3	14	77	76	84
May	29.814	29.840	81.6	90	11	86.9	72	27	76.3	14	77	76	88
June	29.798	29.824	80.8	90	6	86.1	74	24	75.4	14	78	77	94
July	29.836	29.862	80.6	90	3	86.5	73	6	74.8	15	76	75	80
August	29.854	29.880	80.7	90	30	86.8	73	7	74.6	16	76	75	90
September	29.832	29.858	80.8	90	20	86.6	74	17	74.9	16	76	74	87
October	29.824	29.850	80.3	89	3	86.2	73	21	74.4	15	75	74	89
November	29.815	29.845	79.8	90	11	85.4	72	3	74.2	15	75	74	88
December	29.810	29.848	79.8	88	12	84.3	72	10	75.3	13	75	74	84
Year	29.835	29.863	80.6	90	³ 11	85.7	72	³ 27	75.6	16	76	74.8	87.1

Month.	Precipitation (inches).			Wind.					Number of days.				
	Monthly total.	Normal. ⁴	Rainy days.	Total movement (miles).	Prevailing direction.	Maximum velocity.			Clear.	Partly cloudy.	Cloudy.	Thunderstorms.	Average cloudiness. ⁵
						Miles per hour.	Direction.	Date.					
January	2.33	3.92	11	11,323	NE.	33	N.	23	20	6	5	2	3.8
February	1.96	1.72	22	11,532	N.	33	N.	17	8	15	8	0	5.0
March	2.68	1.66	19	10,929	N.	33	N.	19	16	13	8	0	3.9
April	6.25	4.23	12	8,424	N.	31	NE.	12	4	18	8	3	6.0
May	9.38	12.58	21	5,790	SE.	31	NW.	26	0	14	17	9	7.8
June	14.28	13.46	24	5,532	SE.	26	SW.	25	0	5	25	12	8.4
July	10.44	16.19	20	4,325	SE.	23	NE.	18	1	13	17	10	7.4
August	8.34	14.90	21	4,866	SE.	32	S.	31	0	11	20	9	8.3
September	10.41	12.51	25	4,881	SE.	31	NE.	3	0	7	23	9	8.4
October	17.59	14.78	23	5,831	SE.	33	W.	10	3	6	22	5	7.8
November	14.08	21.51	23	6,910	SE.	38	W.	16	1	10	19	4	7.8
December	5.71	11.91	17	9,481	NW.	33	NW.	29	9	15	7	1	5.8
Year	103.45	129.37	238	89,824	SE.	38	W.	⁶ 16	62	133	171	64	6.7

¹ Station moved to Cristobal, C. Z., Nov. 20, 1916.² Elevation of barometer 36 feet above sea level.³ May.⁴ Average for 46 years of record.⁵ Tenths of sky.⁶ November.

TABLE No. 5.—*Monthly evaporation, Canal Zone, years 1916 and 1917.*

[Value in inches.]

Month.	Balboa Heights. ¹			Gatun.			Colon.		
	1916	1917	Average (9 years).	1916	1917	Average (6 years).	1916	1917	Average (8½ years).
January.....	6.516	7.188	5.712	6.280	6.194	6.056	6.840	7.387	6.253
February.....	6.828	6.934	6.039	5.985	6.229	6.146	6.080	7.345	6.176
March.....	7.028	9.283	7.166	6.424	7.246	7.354	6.280	6.878	7.037
April.....	5.142	6.725	5.326	6.391	6.514	6.684	5.185	5.508	5.934
May.....	3.183	4.159	3.446	5.290	4.903	5.126	3.781	3.769	3.860
June.....	2.448	2.994	2.960	4.430	4.110	4.196	3.744	3.040	3.217
July.....	2.748	.....	3.199	4.491	.....	4.538	3.553	.....	3.099
August.....	2.529	.....	3.155	4.793	.....	4.521	2.749	.....	3.141
September.....	2.949	.....	3.200	4.545	.....	4.375	2.761	.....	3.180
October.....	3.309	.....	3.347	4.267	.....	4.116	2.993	.....	3.308
November.....	2.904	.....	2.951	3.797	.....	3.522	2.873	.....	2.931
December.....	4.770	.....	4.282	4.865	.....	4.847	4.608	.....	4.280
Year.....	50.354	.....	50.783	61.558	.....	61.481	51.447	.....	52.416

¹ Formerly Ancon station. Moved to Balboa Heights Oct. 1, 1914.

NOTE.—Insulated tanks 10 inches in diameter at Balboa Heights and Colon. Water surface protected from action of sun and rain. Exposed pan 4 feet in diameter and 10 inches deep floating in water at Gatun. For monthly evaporation during past years see previous annual reports.

TABLE No. 6.—*Tidal conditions, year 1916.*

[Elevations in feet referred to mean sea level.]

PACIFIC COAST—BALBOA, CANAL ZONE.

Month.	Maximum high.	Date.	Extreme low.	Date.	Maximum amplitude. ¹	Date.	Minimum amplitude. ¹	Date.
January.....	9.7	7	— 9.4	7	19.1	7	6.8	15
February.....	9.0	5	—10.9	5	19.9	5	5.3	13
March.....	9.0	5 and 6	— 9.6	5	18.6	5	5.4	13
April.....	9.1	20	— 9.1	3	17.9	3	6.1	12
May.....	9.0	18	— 8.9	19	17.8	19	6.7	11
June.....	9.4	18	— 9.1	17	18.2	18	8.0	9
July.....	9.8	18	— 9.3	17	19.1	18	7.1	25
August.....	10.4	16	— 9.3	15	19.7	16	5.2	24
September.....	10.6	13	— 9.0	14	19.4	13	5.9	21
October.....	9.9	12	— 8.6	12	18.5	12	6.2	20 and 21
November.....	8.7	9	— 8.9	27	17.4	28	6.7	19
December.....	9.3	28	— 9.7	26	18.8	27	7.4	19
Year.....	10.6	Sept. 13	—10.9	Feb. 5	19.9	Feb. 5	5.2	Aug. 24

ATLANTIC COAST—CRISTOBAL, CANAL ZONE.

January.....	1.28	6	—0.53	4	1.79	5	0.21	15
February.....	1.23	1	— .46	1 and 27	1.69	1	.20	11
March.....	1.12	1 and 28	— .56	12	1.45	25 and 26	.20	6 and 16
April.....	.97	24	— .62	22	1.55	22	.20	12 and 16
May.....	1.08	22	— .79	19	1.74	20	.20	8, 13, and 28
June.....	1.34	16	— .63	30	1.82	16	.20	8
July.....	1.06	13	— .68	15	1.72	13	.23	24
August.....	1.04	21	— .58	9 and 11	1.57	11	.22	8
September.....	.99	7	— .58	7	1.46	8	.20	5
October.....	1.18	31	— .59	3	1.52	3	.22	19
November.....	1.26	1	— .66	15	1.69	26	.24	16
December.....	1.05	4	— .88	24	1.67	24	.20	17
Year.....	1.34	June 16	— .88	Dec. 24	1.81	June 16	.20	(²)

¹ For consecutive tides.² Several dates.

NOTE.—One tidal fluctuation is often entirely absent at Cristobal.

TABLE No. 7.—*Seismograph records, Balboa Heights, Canal Zone, year ended June 30, 1917.*

[Lat. 8° 58' N.; Long. 79° 33' W.]

(100 K Bosch-Omori seismographs. Greenwich mean time; midnight to midnight.)

Date.	Component.	Time of beginning.		Time of—		Maximum amplitude, millimeters.	Approximate distance of epicenter.	
		Preliminary tremors.	Long waves.	Maximum.	End.		Miles.	Probable direction.
1916.								
July 17.	N-S.	22 36 28	22 35 38	22 36 40	22 37 10	1.0	70	(?)
	E-W.	22 36 32	22 36 41	22 36 42	22 37 16	1.5	70	(?)
July 18.	N-S.	5 10 08	5 10 53	5 11 00	5 19 28	12.0	235	NW.
	E-W.	5 10 12	5 11 00	5 11 28	5 17 16	11.0	235	NW.
July 18.	N-S.	No record, clock stopped.				3.0		
	E-W.	18 41 34	18 42 14	18 42 28	18 45 16	1.5	210	NW.
July 28.	N-S.	17 38 28	17 39 23	17 40 15	17 55 04	23.0	275	NW.
	E-W.	17 38 27	17 39 24	17 40 04	17 53 15	12.0	275	NW.
Aug. 14.	N-S.	23 48 55	23 50 03	23 50 18	23 58 30	8.0	320	(?)
	E-W.	23 48 55	23 50 03	23 50 18	23 58 30	8.0	320	(?)
Aug. 16.	N-S.	14 29 54	14 30 39	14 31 14	14 36 00	4.5	230	(?)
	E-W.	14 29 54	14 30 39	14 31 14	14 36 00	4.5	230	(?)
Aug. 16.	N-S.	18 32 10	18 32 56	18 33 04	18 37 30	2.0	230	(?)
	E-W.	18 32 10	18 32 56	18 33 04	18 37 30	2.0	230	(?)
Sept. 11.	N-S.	10 18 12	10 18 48	10 18 52	10 22 30	5.0	186	NW.
	E-W.	10 18 10	10 18 46	10 18 50	10 23 00	4.5	186	NW.
Sept. 23.	N-S.	5 44 35	5 47 05	5 47 17	6 06 20	8.0	600	N.
	E-W.	5 44 35	5 47 00	5 49 35	6 03 00	1.5	600	N.
Oct. 3.	N-S.	1 31 55	1 37 00	1 38 20	2 33 00	1.5	1,100	N.
	E-W.	1 31 55	1 37 05	1 39 35	2 20 00	0.5	1,100	N.
Oct. 15.	N-S.	1 25 10	1 25 40	1 25 44	1 29 20	0.5	160	(?)
	E-W.	1 25 10	1 25 39	1 25 47	1 28 40	0.5	160	(?)
Nov. 20.	N-S.	18 16 02	18 16 40	18 16 50	18 21 00	0.5	195	(?)
	E-W.	18 16 02	18 16 40	18 16 50	18 20 00	0.4	195	(?)
Nov. 21.	N-S.	6 29 18	6 35 18	6 38 34	7 04 00	1.0	1,250	(?)
	E-W.	Movement barely perceptible.						
Dec. 10.	N-S.	(?)	(?)	(?)	(?)	0.1	(?)	(?)
	E-W.	3 45 46	3 46 04	3 46 10	3 46 38	0.7	105	(?)
Dec. 19.	N-S.	3 53 40	3 53 50	3 53 50	3 55 00	1.2	70	(?)
	E-W.	3 53 40	3 53 50	3 53 50	3 54 45	1.0	70	(?)
1917.								
Jan. 30.	N-S.	3 02 02	3 25 21	3 51 05	4 16 02	1.0	4,950	(?)
	E-W.	3 02 02	3 26 34	3 38 28	4 17 00	1.0	4,950	(?)
Feb. 5.	N-S.	6 09 14	6 09 40	6 09 50	6 14 26	3.8	145	(?)
	E-W.	6 09 16	6 09 42	6 09 42	6 14 28	4.0	145	(?)
Feb. 20.	N-S.	19 32 14	19 37 31	19 37 48	20 18 08	39.0	1,045	(?)
	E-W.	19 32 19	19 36 43	19 37 02	20 15 00	45.0+	1,045	(?)
Feb. 26.	N-S.	No record, clock stopped.						
	E-W.	3 57 54	3 58 28	3 58 30	4 03 06	2.4	195	(?)
Mar. 6.	N-S.	3 09 40	3 12 50	3 12 57	3 43 02	1.0	670	(?)
	E-W.	3 09 44	3 13 04	3 15 06	3 36 12	0.5	670	(?)
Mar. 13.	N-S.	9 45 04	9 45 32	9 45 34	9 47 04	1.0	114	(?)
	E-W.	9 45 02	9 45 34	9 45 36	9 47 12	0.5	114	(?)
Mar. 29.	N-S.	2 05 00	2 09 04	2 09 44	2 23 01	1.6	760	(?)
	E-W.	2 05 01	2 07 29	2 07 49	2 17 29	0.2	760	(?)
May 1.	N-S.	18 43 20	18 59 10	19 35 50	21 54 00	1.5	3,300	(?)
	E-W.	18 43 37	18 59 32	19 24 10	21 01 00	3.0	3,300	(?)
June 8.	N-S.	(?)	0 44 19	0 44 52	0 46 56	1.2	600	NW.
	E-W.	(?)	(?)	0 45 22	(?)	0.3	600	NW.
June 8.	N-S.	0 54 08	0 56 44	0 58 16	2 02 05	4.0	600	NW.
	E-W.	0 54 10	0 56 38	1 01 18	1 59 00	2.0	600	NW.
June 8.	N-S.	(?)	(?)	3 09 00	(?)	0.2	(?)	(?)
	E-W.	Very slight movement; too small to compute.				(?)	(?)	(?)
June 13.	N-S.	(?)	(?)	7 39 55	(?)	0.2	(?)	(?)
	E-W.	(?)	7 34 55	7 41 00	8 07 00	0.2	(?)	(?)
June 26.	N-S.	6 04 00	6 15 07	6 16 04	8 33 20	3.0	3,000	(?)
	E-W.	6 03 32	6 14 52	6 15 00	8 23 00	2.0	3,000	(?)
June 27.	N-S.	12 27 30	12 28 28	12 29 04	12 56 00	68.0	290	N.
	E-W.	12 27 32	12 28 32	12 28 56	12 57 00	39.0	290	N.
June 30.	N-S.	17 51 14	17 51 50	17 52 04	18 00 22	40.0	155	W.
	E-W.	17 51 18	17 51 53	17 52 30	18 00 22	53.0	155	W.
June 30.	N-S.	18 00 22	18 00 57	18 01 05	18 16 49	19.0	155	W.
	E-W.	18 00 22	18 00 58	18 01 24	18 17 00	20.0	155	W.
June 30.	N-S.	(?)	(?)	22 20 01	(?)		(?)	(?)
	E-W.	(?)	(?)	22 20 03	(?)		(?)	(?)

NOTE.—Period of pendulum, 20 seconds; magnification, 35; damping medium. The amplitude indicates the maximum displacement of the pen. Laska's formula used in computing distances of remote earthquakes (620 miles or more) and Omori's formula for earthquakes less than 620 miles distant.

HYDROGRAPHY.

Like the preceding years since Gatun Lake has been an actual body of water (1911 to date) the yield of the watershed has more than been sufficient for the requirements necessary to operate the canal. The total yield in 1916 was 10 per cent above the six-year normal (1911 to 1916, inclusive), or 6,684 cubic feet per second against a normal of 6,092 cubic feet per second. As shown on plate No. 12, the relative proportions of various sources of inflow and the disposition of the same for the calendar year 1916 was as follows:

	Billion cubic feet.
Total yield (100 per cent)-----	211.71
Net yield (89 per cent)-----	187.98
Land area yield (83 per cent)-----	175.03
Spillway waste (67 per cent)-----	142.59
Yield from rain or lake surface (17 per cent)-----	36.69
Operative and useful losses (21 per cent)-----	44.44
Evaporation of lake (11 per cent)-----	23.73

The Gatun Lake total yield for the dry season 1917 (January to April, inclusive), was 35 per cent below the seven-year dry season normal, or 1,348 cubic feet per second against an average yield of 2,076 cubic feet per second. Only once since the formation of Gatun Lake has the dry-season yield been below that of 1917. The yield in 1912 was 892 cubic feet per second.

While the lake fell steadily during the dry season from elevation +86.70 to +83.14, equivalent to a loss in storage of 16.14 billion cubic feet, there was still sufficient water to have furnished 11.7 additional lockages per day without cross filling in addition to the 5.5 lockages which actually occurred without lowering the lake below +81 feet assuming 7 million cubic feet per lockage or to have made 27.5 lockages per day and have the lake level +79 feet, which would give a minimum depth in the completed channel of 39 feet.

The principal source of Gatun Lake watershed dry-season supply is the Chagres River above Alhajuela. The run-off from this section during the dry season of 1917 was 49 per cent below its average yield, or 686 cubic feet per second against a 16-year dry-season normal of 1,343 cubic feet per second.

Table 14 gives the monthly maximum, minimum, and mean discharge of Alhajuela for 1916; while Plate No. 13 shows graphically the average monthly discharge for Alhajuela.

Tables Nos. 8 and 9 give the hydrology of Gatun Lake watershed for the year 1916, and the dry season 1917. Likewise Tables Nos. 10 and 11 cover Miraflores Lake watershed. Table No. 17 gives the monthly Gatun Lake, Miraflores Lake, and Chagres River heights for the year 1916. Table No. 15 gives the run-off data for the Gatun Lake watershed.

There were lockages as follows in 1916 and 1917:

	Calendar year 1916.	Dry season 1917.
Gatun.....	1,335	634
Pedro Miguel.....	1,490	695
Miraflores.....	1,399	690

Plate No. 14 gives a graphical chart of the operation disposal of the total yield of Gatun Lake watershed for 1916, and dry season of 1917. Plate No. 15 gives a graphical chart of the Gatun Lake total yield massed for the period 1911 to 1916 inclusive, and the dry season 1917, while Plate No. 16 gives the average monthly total yield for the same period.

There were no large freshets during the year 1916, although the 14 freshets, with a rise of over 5 feet at Vigia, were well distributed throughout the year. Data on the principal freshets are given in Table No. 16.

Fifty-eight current meter measurements were made in the Chagres River at the Calle Larga gauging station during 1916, and 35 in 1917, up to July 1, covering elevation 110.80 to 95.97, inclusive. Ten gaugings were made in 1916, and 5 in 1917, at Dos Bocas (the forks of the Chagres), covering the discharges of the La Puente, the Pequeni, and the Chagres branches. The Calle Larga cross section has remained practically unchanged during the past year.

Tables Nos. 12 and 13 give the hydrology of the Chagres for 1916, and the dry season 1917. Plate No. 17 gives a graphical chart of the massed curves of discharge at Alhajuela for the current and extreme years.

Alhajuela and Vigia have been continued as floor warning stations.

The following plates and tables accompany this report:

Plate No. 12. Gatun Lake yields, storage and losses massed.

Plate No. 13. Alhajuela average monthly discharges.

Plate No. 14. Operating uses of Gatun Lake.

Plate No. 15. Total yield for Gatun Lake massed.

Plate No. 16. Total yield for Gatun Lake.

Plate No. 17. Alhajuela discharge mass curves.

Plate No. 18. Alhajuela discharge duration curves.

Table No. 8. Hydrology of Gatun Lake watershed, 1916.

Table No. 9. Hydrology of Gatun Lake watershed, dry season 1917.

Table No. 10. Hydrology of Miraflores Lake watershed, 1916.

Table No. 11. Hydrology of Miraflores Lake watershed, dry season 1917.

Table No. 12. Hydrology of Chagres River, 1916.

Table No. 13. Hydrology of Chagres River, dry season 1917.

Table No. 14. Monthly discharge of Chagres River at Alhajuela, 1916.

Table No. 15. Monthly Gatun Lake hydrology, 1916.

Table No. 16. Principal freshets of 1916 and dry season 1917.

Table No. 17. Maximum, minimum and mean elevations by months at all stations, year 1916.

TABLE No. 8.—*Hydrology, Gatun Lake, year 1916.*

[Drainage area, 1,320 square miles.]

Lake data.	Elevation.	Date.
Yearly mean.....	86.37	
Maximum.....	86.85	Nov. 17, 1916.
Minimum.....	85.90	May 5, 1916.

	Quantities in—	
	Million cubic feet.	Second-feet.
Gatun locks, lake regulation.....	1,965	62.1
Gatun spillway, waste, gate operations.....	140,632	4,447.2
Gatun spillway, leakage.....	115	3.6
Gatun locks, lockages and tests.....	5,637	178.3
Gatun locks, leakage (5.93 c. f. s.).....	188	5.9
Gatun hydroelectric plant.....	32,216	1,018.8
Pedro Miguel lock, lockages and tests ¹	4,423	139.8
Pedro Miguel lock, leakage ¹	158	5.0
Maintaining Miraflores Lake through Pedro Miguel lock ¹	853	27.0
Pumping at Gaillard Cut ¹	110	3.5
Brazos Brook Reservoir.....	277	8.8
Pumping at Gamboa.....	465	14.7
(a) Total outflow.....	187,039	5,914.7
(b) Storage (+ increase; — decrease).....	+950	+30.0
(c) Net yield (a ± b).....	187,989	5,944.7
(d) Evaporation on lake (61.558 inches).....	23,740	750.7
(e) Total yield (c + d).....	211,729	6,695.4
(f) Rainfall on lake surface (95.12 inches).....	36,683	1,160.3
(g) Yield from land area (e - f).....	175,046	5,535.1
Transferred into Miraflores Lake ¹	5,544	175.3

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage (run-off).
Lake surface.....	166.0	95.1	95.1	100
Land area.....	1,154.0	105.8	65.3	62
Total watershed.....	1,320.0	104.4	69.0	66

¹ Transferred into Miraflores Lake.

TABLE NO. 9.—*Hydrology, Gatun Lake, dry season, 1917.*¹

[Drainage area, 1,320 square miles.]

Date.	Elevation.	Capacity (billion cubic feet).	Lake data.	Elevation.	Date.
Jan. 1.....	86.66	190.70	Season mean.....	85.20	
Apr. 30.....	83.42	175.98	Maximum.....	86.70	Jan. 2
			Minimum.....	83.14	Apr. 27
Season loss.....		14.72			

	Quantities in—	
	Million cubic feet.	Second- feet.
Gatun spillway, waste, gate operations.....	93.94	9.06
Gatun spillway, leakage.....	44.79	4.32
Gatun locks, lockages and tests.....	2,757.63	265.98
Gatun locks, leakage (5.93 c. f. s.).....	61.48	5.93
Gatun hydroelectric plant.....	12,910.57	1,245.23
Pedro Miguel lock, lockages and tests ²	2,210.29	213.19
Pedro Miguel lock, leakage ²	51.74	4.99
Maintaining Miraflores Lake through Pedro Miguel lock ²	317.79	30.65
Pumping at Gaillard Cut ²	13.24	1.28
Brazos Brook Reservoir.....	97.93	9.45
Pumping at Gamboa.....	146.05	14.09
(a) Total outflow.....	18,705.45	1,804.17
(b) Storage (+ increase; — decrease).....	—14,720.00	—1,419.75
(c) Net yield ($a \pm b$).....	3,985.45	384.42
(d) Evaporation lake (26.183 inches).....	9,988.01	963.35
(e) Total yield ($c + d$).....	13,973.46	1,347.77
(f) Rainfall on lake surface (6.11 inches).....	2,330.78	224.80
(g) Yield from land area ($e - f$).....	11,642.68	1,122.97
Transferred into Miraflores Lake ²	2,593.06	250.11

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage (run-off).
Lake surface.....	164.2	6.11	6.11	100
Land area.....	1,155.8	4.83	4.33	90
Total watershed.....	1,320.0	4.99	4.55	91

¹ Dry season months are January, February, March, and April.² Transferred into Miraflores Lake.

Pedro Miguel lockages, 695, Gatun lockages, 634.

TABLE NO. 10.—*Hydrology, Miraflores Lake, year 1916.*

[Drainage area, 38.5 square miles.]

Lake data.	Elevation.	Date.
Yearly mean.....	53.88	
Maximum.....	54.70	Oct. 20
Minimum.....	51.40	Jan 12

	Quantities in—	
	Million cubic feet.	Second-feet.
Miraflores spillway, waste, gate operations.....	2,502	79.1
Miraflores spillway, leakage (1 c. f. s.).....	41	1.3
Miraflores locks, lockages, and tests.....	4,795	151.6
Miraflores locks, leakages (5.30 c. f. s.).....	451	14.3
Miraflores cooling water (power plant).....	525	16.6
Miraflores locks, lake regulation.....	51	2.6
(a) Total outflow.....	8,395	265.5
(b) Total inflow from Gatun Lake ¹	5,553	175.6
(c) Storage (+, increase; — decrease).....	+19	+ .6
(d) Net yield ($a-b$, $\pm c$).....	2,861	90.5
(e) Evaporation on lake (54.216 inches).....	202	6.4
(f) Total yield ($d+e$).....	3,063	96.9
(g) Rainfall on lake surface (89.30 inches).....	332	10.5
(h) Yield from land area ($f-g$).....	2,731	86.4
Includes filtration-plant wash water ¹	9	.3

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage (run-off).
Lake surface.....	1.6	89.3	89.3	100.0
Land area.....	36.9	89.2	31.8	35.6
Total watershed.....	38.5	89.2	34.3	38.4

¹ Includes filtration-plant wash water.

Miraflores lockages, 1,399.

TABLE NO. 11.—*Hydrology, Miraflores Lake, dry season, 1917.*¹

[Drainage area, 33.5 square miles.]

Lake data	Elevation	Date	
Season mean.....	53.62		
Maximum.....	54.30	Jan. 1 and Mar. 22.	
Minimum.....	51.30	Jan. 22.	

	Quantities in—	
	Million cubic feet	Second-feet.
Miraflores spillway, waste, gate operations.....	56.13	5.41
Miraflores spillway, leakage (1.00 c. f. s.).....	10.37	1.00
Miraflores locks, lockages and tests.....	2, 277.59	219.68
Miraflores locks, leakages (5.30 c. f. s.).....	54.95	5.30
Miraflores cooling water (power plant).....	259.20	25.00
Miraflores locks, lake regulation.....	10.57	1.02
(a) Total outflow.....	2, 668.81	257.41
(b) Total inflow from Gatun Lake ²	2, 596.49	250.44
(c) Storage (+ increase; — decrease).....	— 11.00	— 1.06
(d) Net yield ($a-b$, $\pm c$).....	61.32	5.91
(e) Evaporation on lake (23.898 inches).....	88.83	8.57
(f) Total yield ($d+e$).....	150.15	14.48
(g) Rainfall on lake surface (2.36 inches).....	8.77	.85
(h) Yield from land area ($f-g$).....	141.38	13.63
Includes filtration plant wash water ²	3.43	.33

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage (run-off).
Lake surface.....	1.6	2.36	2.36	100
Land area.....	36.9	2.22	1.65	74
Total watershed.....	38.5	2.23	1.70	76

¹ Dry season months are January, February, March, and April.Miraflores lockages, 690. ² Includes filtration plant wash water.TABLE NO. 12.—*Hydrology of Chagres River, year 1916.*

Alhajuela. Drainage area, 427 square miles.

Low water (feet above mean sea level).....	91.0
Distance from Gatun (miles).....	38.5
Mean:	
Elevation (feet above mean sea level).....	92.98
Discharge (second-feet).....	2, 597
Maximum:	
Day of month, Dec. 14.	
Elevation (feet above mean sea level).....	101.55
Discharge (second-feet).....	25, 460
Minimum:	
Day of month, Apr. 10.	
Elevation (feet above mean sea level).....	91.14
Discharge (second-feet).....	474
Percentage of yield at Gatun.....	<div style="display: flex; align-items: center;"> { <div> ¹ 44 ² 39 </div> </div>
Length of records (years).....	
Compared with station average, total period, per cent below.....	15
	1

¹ Compared with net yield.² Compared with total yield.

TABLE No. 13.—*Hydrology of Chagres River, dry season, 1917.*¹

Alhajuela. Drainage area, 427 square miles.

Low water (feet above mean sea level)-----	91.0
Distance from Gatun (miles)-----	38.5
Mean: '-----	
Elevation (feet above mean sea level)-----	91.43
Discharge (second-feet)-----	686
Maximum:-----	
Day of month, Apr. 30.	
Elevation (feet above mean sea level)-----	93.90
Discharge (second-feet)-----	3,830
Minimum:-----	
Day of month, Apr. 26 and 27.	
Elevation (feet above mean sea level)-----	90.72
Discharge (second-feet)-----	268
Percentage of yield at Gatun-----	² 51
Length of records (years)-----	16
Compared with station average, same seasons, per cent below-----	49

¹ Dry-season months are January, February, March, and April.² Compared with total yield.TABLE No. 14.—*Monthly discharge, Chagres River, Alhajuela, 1916.*

[Drainage area, 427 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on water-shed).
	Maximum.	Minimum.	Mean.	Per square mile.	
January.....	2,400	924	1,433	3.36	3.874
February.....	2,968	709	1,028	2.41	2.599
March.....	2,074	548	776	1.82	2.098
April.....	13,858	474	776	1.82	2.031
May.....	12,722	624	2,091	4.90	5.649
June.....	13,432	1,764	3,121	7.31	8.156
July.....	21,115	1,432	2,895	6.78	7.817
August.....	20,630	2,491	4,123	9.66	11.137
September.....	16,848	2,148	3,996	9.36	10.443
October.....	13,801	2,614	4,341	10.16	11.700
November.....	11,890	2,460	3,897	9.13	10.186
December.....	25,460	1,576	2,691	6.30	7.263
The year.....	25,460	474	2,597	6.08	6.913

TABLE No. 15.—*Gatun Lake, 1916.*

[Drainage area, 1,320 square miles.]

1	2	3	4	5	6	7	8
Month.	Mean elevation above mean sea level.	Area for mean elevation.	Spillway discharge. ¹	Storage (+increase, —decrease).	Evaporation from lake surface.	Run-off net yield (4+5).	Total yield (4+5+6).
	<i>Feet.</i>	<i>Sq. miles.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>	<i>Sec.-feet.</i>
January.....	86.59	166	1,865	— 1	899	1,864	2,763
February.....	86.37	166	1,244	+ 76	921	1,320	2,241
March.....	86.33	166	1,359	—661	925	698	1,623
April.....	86.06	166	1,204	—127	951	1,077	2,028
May.....	86.26	166	3,316	+747	762	4,063	4,825
June.....	86.41	166	6,040	—193	659	5,847	6,506
July.....	86.40	166	6,100	+261	647	6,361	7,008
August.....	86.41	166	9,937	—205	690	9,732	10,422
September.....	86.35	166	9,064	— 39	676	9,025	9,701
October.....	86.37	166	13,976	— 90	614	13,886	14,500
November.....	86.39	166	12,051	+289	565	12,340	12,905
December.....	86.48	166	4,672	+314	700	4,986	5,686
The year...	86.37	166	5,902	+ 31	751	5,933	6,684

¹ Includes leakages, lockages, pumping, and power water.

TABLE No. 16.—*Principal freshets of year 1916, and dry season 1917.*

Date of beginning.	Vigia.		Alhajuela.				Gamboa.				
	Eleva- tion of crest.	Rise (feet).	Eleva- tion of crest.	Rise (feet).	Hours after Vigia.	Maxi- mum dis- charge c. f. s.	Eleva- tion of crest.	Rise (feet).	Hours after Vigia.	Per cent of Vigia rise	Per cent of Alha- juela rise.
1916.											
Apr. 11.....	133.30	7.95	97.95	6.35	1½	13,858	86.27	0.30	2	4	5
May 5.....	132.45	7.00	97.20	5.60	1½	11,752	86.02	.10	6½	1	2
June 8.....	133.20	7.05	97.80	5.27	1½	13,432	86.60	.12	.....	2	2
July 30.....	136.90	10.15	100.35	7.35	1	21,115	86.54	.21	1½	2	3
July 31.....	136.10	8.45	100.00	7.30	1½	20,000	86.54	.32	9½	4	4
Aug. 5.....	136.50	9.15	100.20	6.68	1½	20,630	86.60	.31	9½	3	5
Sept. 27.....	134.50	6.90	98.80	5.00	1½	16,422	86.37	.11	.....	2	2
Dec. 4.....	138.95	12.40	101.55	8.74	1½	25,460	86.59	.14	.....	1	2

There were no freshets in 1917.

TABLE No. 17.—*Monthly maximum, minimum, and mean elevations for Gatun Lake, Miraflores Lake, and Chagres River, 1916.*

1916	Gatun Lake.								
	Gatun.			Trinidad.			Monte Lirio.		
	Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.
January.....	86.75	86.44	86.59	86.76	86.45	86.62	86.76	86.49	86.63
February.....	86.50	86.25	86.37	86.52	86.28	86.40	86.50	86.30	86.41
March.....	86.52	86.09	86.33	86.55	86.07	86.36	86.54	86.14	86.37
April.....	86.25	85.91	86.06	86.26	85.91	86.05	86.26	85.95	86.07
May.....	86.51	85.90	86.26	86.49	85.93	86.22	86.51	85.94	86.25
June.....	86.56	86.29	86.41	86.52	86.23	86.39	86.67	86.31	86.44
July.....	86.57	86.24	86.40	86.55	86.20	86.39	86.56	86.31	86.43
August.....	86.84	86.25	86.41	86.84	86.22	86.39	86.89	86.27	86.45
September.....	86.49	86.23	86.35	86.46	86.21	86.34	86.48	86.29	86.38
October.....	86.59	86.26	86.37	86.57	86.20	86.33	86.67	86.22	86.38
November.....	86.85	86.25	86.39	86.80	86.20	86.37	87.11	86.26	86.41
December.....	86.68	86.29	86.48	86.70	86.19	86.44	86.72	86.29	86.50
The year.....	86.85	85.90	86.37	86.84	85.91	86.36	87.11	85.94	86.39

1916	Gatun Lake.								
	Bohío.			Frijoles.			San Pablo.		
	Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.
January.....	86.80	86.52	86.68	86.78	86.48	86.65	86.79	86.53	86.66
February.....	86.60	86.38	86.47	86.53	86.30	86.44	86.53	86.34	86.44
March.....	86.60	86.21	86.44	86.51	86.15	86.36	86.55	86.17	86.40
April.....	86.30	86.01	86.15	86.26	85.95	86.08	86.28	85.93	86.11
May.....	86.52	86.01	86.29	86.57	85.94	86.26	86.54	85.97	86.28
June.....	86.61	86.35	86.46	86.59	86.30	86.44	86.61	86.30	86.44
July.....	86.62	86.30	86.46	86.59	86.27	86.44	86.64	86.27	86.44
August.....	86.90	86.28	86.48	86.89	86.21	86.44	86.83	86.22	86.45
September.....	86.55	86.31	86.43	86.52	86.21	86.38	86.52	86.26	86.39
October.....	86.64	86.28	86.41	86.64	86.20	86.38	86.67	86.22	86.39
November.....	86.89	86.28	86.45	86.86	86.26	86.42	86.86	86.26	86.41
December.....	86.79	86.33	86.54	86.72	86.28	86.51	86.73	86.29	86.51
The year.....	86.90	86.01	86.44	86.89	85.94	86.40	86.88	85.93	86.41

TABLE No. 17.—*Monthly maximum, minimum, and mean elevations for Gatun Lake, Miraflores Lake, and Chagres River, 1916—Continued.*

1916.	Gatun Lake.								
	Gamboa.			Pedro Miguel.			Juan Mina.		
	Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.
January	86.77	86.43	86.62	86.99	86.16	86.58	86.82	86.49	86.66
February.....	86.57	86.22	86.38	86.98	85.71	86.39	86.58	86.28	86.44
March.....	86.59	86.10	86.36	87.00	85.65	86.32	86.61	86.12	86.41
April.....	86.31	85.58	86.05	86.94	85.27	86.04	86.32	85.94	86.11
May.....	86.53	85.81	86.23	87.13	85.19	86.19	86.58	85.96	86.28
June.....	86.60	86.14	86.39	87.20	85.12	86.35	86.66	86.27	86.44
July.....	86.59	86.10	86.38	87.27	85.28	86.37	86.62	86.28	86.45
August.....	86.90	86.04	86.39	87.65	85.38	86.36	86.92	86.17	86.44
September.....	86.53	86.10	86.33	87.27	85.34	86.33	86.62	86.24	86.39
October.....	86.64	86.07	86.33	87.38	85.10	86.32	86.77	86.19	86.39
November.....	86.82	86.10	86.37	87.50	85.24	86.36	86.94	86.26	86.43
December.....	86.77	86.13	86.47	87.83	85.29	86.47	86.82	86.25	86.51
The year	86.90	85.58	86.36	87.83	85.10	86.34	86.94	85.94	86.41

1916	Chagres River.						Miraflores Lake, south- ern end Pedro Miguel lock.		
	Alhajuela.			Vigia.					
	Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.
January	92.96	91.91	92.30	126.85	125.45	125.88	54.10	51.40	52.65
February.....	93.33	91.66	91.98	127.35	125.20	125.59	54.36	53.00	53.82
March.....	92.74	91.31	91.70	126.15	124.95	125.17	54.35	53.55	53.99
April.....	97.95	91.14	91.58	133.55	124.87	125.27	54.40	53.43	53.95
May.....	97.55	91.48	92.71	133.20	125.15	126.47	54.47	53.54	53.97
June.....	97.80	92.53	93.38	133.40	126.15	127.26	54.47	53.67	54.01
July.....	100.35	92.30	93.25	136.90	126.00	127.10	54.40	53.66	54.05
August.....	100.20	93.02	93.95	136.50	126.70	127.88	54.53	53.60	54.01
September.....	98.95	92.79	93.88	134.50	126.50	127.85	54.45	53.65	54.02
October.....	97.93	93.10	94.05	133.15	126.80	128.03	54.70	53.46	54.04
November.....	97.25	93.00	93.84	132.20	126.65	127.76	54.65	53.42	54.01
December.....	101.55	92.40	93.12	138.95	126.00	126.96	54.50	53.56	54.02
The year	101.55	91.14	92.98	138.95	124.87	126.77	54.70	51.40	53.88

SECTION OF SURVEYS.

The section of surveys has attended to all Panama Railroad land and lot work and has continued its work of the care and maintenance of the established Canal Zone boundary monuments, triangulation stations, and bench marks; also the installation of new monuments, triangulation stations, and bench marks as required. This section has made surveys and prepared maps for other divisions and for the Joint Land Commission, and has continued its studies of the various features of the canal under observation.

The details of the work accomplished by this section are covered in the report of the assistant engineer which follows:

SECTION OF SURVEYS.

O. E. Malsbury, Assistant Engineer.

BUILDING LOTS.

Colon:

Corner and grade stakes-----	121
Alley stakes-----	53
Folks River corner and grade stakes-----	1
Cristobal corner and grade stakes-----	2
Balboa corner and grade stakes-----	1
Esplanadas corner and grade stakes-----	2
Panama yard corner and grade stakes-----	1
Total stakes set-----lots--	181

Colon monuments.—Surveys were made and 19 block monuments were set. An iron fishplate monument was set in Manz. 2, Folks River.

Strangers Club lease.—A survey was made of the vacant ground between Second and Third Streets and Bottle Alley and the Panama Railroad. The quarter of the track lying adjacent to Second Street was staked out for lease to the Strangers Club, and a map was prepared on a scale of 1 to 600, showing location, dimensions, and area.

Canteens.—A survey was made and the restricted area line, 25 meters from the Zone line, was established by 16 monuments. Sketches were made showing the locations of the canteens.

Cristobal.—A survey was made of the block to the east of the Italian Steamship Company's lot, and a map made up on a scale of 1 inch to 20 feet for fitting in a lot 48 by 87 feet for the United Fruit Company.

A lot was staked out on Roosevelt Avenue for the French Steamship Line and its location and area shown on plan No. 3517.

The area of lot No. 11, Roosevelt Avenue, was determined in square feet and square meters.

Folks River.—A map was prepared showing the location and area of lot No. 13, Manz. 2.

A replot was made of lots 1, 2, 3, and 3½, Manz. 1, and a map prepared showing the new layout with areas.

Las Esplanadas, Panama.—The property line through the alley of section B was staked out for the municipal engineering department on account of construction work; the property line on section II was staked out on account of construction work on adjacent private property.

A survey was made of section A for the new dimensions of lots 12-19-bis, inclusive, on account of a 16-foot roadway at the rear. Lots 16, 17, and 18 were consolidated into two lots and the map revised accordingly.

Three boundary monuments were set in section B.

Balboa.—A lot was staked out for the International Petroleum Company, and its location was shown on blue-print map, file No. 5048-1.

Panama yard.—Lot No. 30 was staked out in Panama yard, and its location, with dimensions and area, shown on a map.

GATUN DAM.

Settlement hubs.—Readings were taken on the settlement hubs once a month, showing the normal settlement throughout the year.

Bench marks D and L₂.—The settlement of bench mark D for the year was 0.255 foot, while that of L₂ was 0.005 foot. Both are in the east valley, D being opposite the upper gates and near the bed of the Old East Diversion, while L₂ is about 1,000 feet from the center gate of the spillway in a line toward the mouth of the French Canal, and is over original high ground of about 40 feet elevation.

Soundings.—Ranges were established and soundings taken to the west of the south approach wall and over the old channel of the East Diversion. The east axis was rerun for the movement of the axis hubs toward the lake. The results were plotted onto map file No. 6031-1.

Fill.—Grade stakes were set for a fill on the east valley, south toe.

Hydroelectric plant.—The elevations of the old bench marks were checked and new ones established for use in the turbine tests.

Mindi.—A profile was taken over Mindi levee, showing normal settlement.

South approach wall.—Elevations were taken over the south approach wall twice each month, showing a maximum settlement of 0.233 foot for points 4 and 6, a minimum settlement of 0.046 foot at point No. 1 near the break, and an average settlement of 0.181 foot.

Four new points were established, two at the break and two at the end, and the two old points, E and W, in the pits at the end of the wall were abandoned. Grades were given on 350 feet of rack track over the break for leveling off the wall.

Cano Saddle.—Levels were run over Cano Saddle twice during the year, showing normal settlement.

BENCH MARKS.

Repairs.—The following precise level bench marks were cleared and repaired: 9A, 10A, 11A, 13A, 14A, 15A, 16A, 17A, P.R.R.B.M.634+50, 7A, 39A, 32, 33, 34, 35, 37, 38, 38A, 43, 43A, 44, 44A.

Transfers.—Precise level bench marks were transferred as follows: P.B.M.39 (Pedro Miguel), account of building construction; P.B.M.45A (Sosa), account of near-by construction work.

Tide gauge, Colon.—The Colon tide gauge bench mark was checked up, and found to be O.K.

Venado Island.—A permanent bench mark was established on Venado Island by the method of simultaneous high tide readings on the island and at Balboa.

PRECISE TRIANGULATION.

Slide commission.—The angles between the stations on Gold, Zion, and Contractors Hills were read in May and October, 1916, and in April, 1917, showing no movement.

Stations along Panama Railroad.—Ten triangulation stations were established along the Panama Railroad as follows: 1, Balboa station; 2, P.B.M.43A at Corozal; 3, tunnel; 4, Pedro Miguel; 5, New Culebra; 6, bridge; 7, T 29-03, opposite Old Gorgona; 8, T 27-13, opposite Old Caimito; 9, New Frijoles; 10, Monte Lirio.

The elevations were determined and descriptions written.

Other new stations.—The following additional new stations were established: 1, Colon wireless (east one of the new towers); 2, Farfan; 3, Groundhog (2 and 3 are Old Pacific Division stations); 4, Amador; 5, Buena Vista; 6, Buzzard; 7, Calle Trece; 8, Chorillo; 9, Cocoa Grove; 10, harbor; 11, hospital; 12, market; 13, Pta. Paitilla S.; 14, sea wall; 15, Shine; 16, Pena Prieta; 17, Tivoli (16 and 17 are three pointers).

Elevations have been determined for all except Farfan, Groundhog, and Pta. Paitilla S.

Repairs.—Sixty-seven Zone triangulation stations were cleared and repaired, and trochans opened up to sight stations. The clearing amounted to 92.7 acres.

West Bas Obispo.—The geodetic coordinates of West Bas Obispo were found to be in error as originally reported, and were accordingly corrected.

New Culebra.—The monument for triangulation station, New Culebra, was referenced out on account of stable construction by the supply department.

Sosa High.—The elevation of triangulation station, Sosa High, was found to be 370.06 feet by a closed circuit of Y levels.

CANAL ZONE BOUNDARY LINES.

Panama.—Monument A at Punta Mala was referenced out on account of road construction to Gabilan Island.

Colon.—The proposed new lines of the boundary between the Canal Zone and the city of Colon were traversed, the coordinates of the angle points determined, map prepared, and a description written up by metes and bounds.

Monument No. 8½ was set.

100-foot contour, Gatun Lake.—The final field sheet data were transferred to the office copy, making two complete sets of blue prints, showing the 100-foot contour monuments.

Five-mile line.—The geodetic coordinates were determined for Canal Zone boundary monuments as follows: No. 139 Δ Dolores; No. 'S 53, 53 $\frac{1}{2}$, 54, and 54 $\frac{1}{2}$ Δ Chilibre; No. 35 Δ Lindero; No. 16 Δ Zorra; No. 'S 154, 155 Δ Canito.

JOINT LAND COMMISSION.

Surveys were made and maps prepared showing boundary lines, areas, and improvements on various estates as follows:

Venada Island.—Geodetic position, shore outline, topography, and area at mean high spring tide.

San Lazaro.—Area redetermined.

Mandinga Pihisba.—Two maps prepared, one showing only the boundary lines and areas of the Mandinga and Pihisba estates and the other showing in addition the boundary lines and areas of the following conflicting estates: Agua Sucia, Cuatro Caminos, Oces, and El Calvario.

Punta Mala.—Survey of the playa made, locating the 2 $\frac{1}{2}$ -foot contour. Tracings and photographs of old French maps were made. A compromise area of the property was consummated.

Arcia Bracho.—This line was established by the placing of five pipe and concrete monuments.

Ensenada de las Minas.—A search was made for a stone monument at the headwaters of the Rio Palo Canoa on the boundary of this estate.

Majagual.—A survey was made of a cane field near Majagual.

Alba.—The areas were determined for two strips of high ground on each side of the mouth of Farfan River, also the area of the remainder of the high ground in this vicinity and to the west of the river.

Alba Guayabal.—Testimony was given before the Joint Land Commission on these two estates.

Flooded land.—An investigation trip was made to the vicinity of Santa Rita in connection with a portion of the flooded area of Gatun Lake.

SUPPLY DEPARTMENT.

Pastures.—Surveys were made and maps prepared showing the boundary lines, areas, roads, trails, fences, etc., on the following pastures: Empire, Gorgona, Pedro Miguel, Mount Hope, and Monte Lirio.

A tracing was made of the land defense maps showing the watercourses over the Mount Hope area. Tracings were also made showing the watercourses from the following sheets: Panama, Miraflores, Pina, and Gatun.

Plantations.—Surveys were made, maps prepared, and areas determined for the Chagres River plantations as follows: Limon, 227 acres; Las Guacas, 169; Gatuncillo, 62; Chilibre, 59.2; Palenque, 25; Rio Hondo, 15; Juan Mina, 47.

CRISTOBAL COALING PLANT.

Spread of piers.—In September and October, 1916, the width between the bridge tracks on the two piers was measured at 12 sections and it was found that the width had increased by one-fourth inch at the most troublesome section and by a maximum of one-half inch at 1,500 feet from the south end, in comparison with the measured width of November and December, 1915, the latter being about one-fourth inch greater than the theoretical span.

Monumented base lines were accordingly established with reference to the center lines of the bridge tracks and measurements were taken twice in November and December, once in January, and thereafter every other month. All measurements to date show that no further movement is taking place.

Settlement of piers.—Relative elevations on the two piers were taken, and profiles drawn up showing the maximum, minimum, and average difference of elevation between the two piers along the center lines of the bridge tracks.

Bridges.—Investigation was made of the condition of the two reclaiming bridges and the found data submitted in the form of sketches showing, first, the positions of the pins and tops of girder columns with reference to the center line of tracks, developing the maximum deviation; second, the tilt of trucks, developing the maximum deviation; third, the reduction of camber in the two bridges.

Unloader cranes.—Profiles were taken over the booms of the unloader cranes in the tests and the results forwarded to Mr. Duchscher.

SURVEY—PANAMA, ANCON, BALBOA.

The survey of the district is about 75 per cent complete. It was divided into 7 sections, over which were established 14 stations by precise triangulation, which, together with those previously established, made a total of 18 stations. Starting from these stations, the district was covered with a network of closed traverses, mostly by transit and steel tape, a few by transit and stadia. To date there are 414 traverse points whose geodetic coordinates and elevations (except 380-387) have been determined.

The scope of the survey is as follows: Panama, location of all important public and private buildings and Panama Railroad property lines; Canal Zone, location of all buildings and sidewalks; both Panama and the Canal Zone, location of street lines, railroads, manholes, fire hydrants, high and low water lines, streams, ponds, culverts, bridges, 5-foot contours up to the highest excavation level on Ancon Hill and just beyond building line on Sosa Hill, and thence 10-foot contours.

In addition, work is being done for the electrical division as follows: Location of man and pull holes, street lights, and transformer houses.

Two methods have been used: First, the plane table; second, the modified plane table or transit and stadia and field-drafting board. The latter method is found to be more satisfactory. The present status of the survey by sheets is as follows: One to four, inclusive, 90 per cent complete; 5-6, map projection only; 7, 80 per cent complete. The finished map will be in two sections on a scale of 1:2,000.

GENERAL SURVEYS.

Coco Solo submarine and aviation base.—A survey was made locating and monumenting the boundary lines of the Coco Solo base. The boundaries are fixed by three concrete monuments. A map was prepared and a description by metes and bounds drawn up.

Military trails.—Land-defense trails were cleared as follows: Main Pina-Gatun trail from the west end of Gatun dam to the Rio Pina, about three-fourths of a mile upstream from the village of Pina, 12.90 miles; Pina Branch trail across the Rio del Media, including the construction of a 30-foot span pack-mule bridge across the Que Pedro, 1.50 miles; Indio Ridge trail, from Δ Burn to the coast, about one-half mile northeast of the village of Pina, 13.88 miles; Indio Low trail, from the borrow pit across the Rio Indio and joining the Indio Ridge trail about 1 mile at right angles to the east of the Zone line, including the construction of two pack-mule bridges, 3.50 miles; Indio Branch trail from Δ Cedar to Δ Muru, 0.69 mile; Lake Shore trail from Δ Pina, past Δ Bruja, to a junction with the Pina-Gatun trail, including branches to landings, 4.06 miles; Miraflores trail, 2.95 miles; Miraflores highway trail, 4.85 miles; Pedro Miguel trail, 1.80 miles; Pedro Miguel highway trail, 6.08 miles. All trails were cleared approximately 20 feet wide except the Miraflores and Pedro Miguel highway trails, which were cleared 40 feet wide. Total, 41.28 miles of 20-foot trail and 10.93 miles of 40-foot trail.

Pacific terminals.—In order to keep a line on the lateral movements of the unloader and reloader wharves of the coal pocket, the quay walls, docks, head walls, and piers, the old test lines were extended and tied in, and where necessary fixed with permanent foresights. The first investigation was completed in January, and the data were tabulated and shown by diagrams on a large tracing. The results obtained indicated the necessity of a check not oftener than once in six months.

Colon radio reservation.—A survey was made of the new boundary lines of the Colon radio reservation, a map prepared, and a description by metes and bounds drawn up. Concrete monuments have been set at some of the corners and their geodetic coordinates determined.

Quarantine hospital reservation.—A survey was made locating the proposed new boundary lines of the quarantine reservation and the present lines of the hospital reservation, with the view of monumenting the whole section in one piece. A map was prepared showing the proposed lines, and arrangements are made for setting the monuments at the completion of the fill now being made in this vicinity.

MISCELLANEOUS.

Royal Mail dock.—A survey and map were made of the Royal Mail dock in Colon.

Fuel-oil farms.—Stadia survey made, locating oil-pipe lines and fence lines on both the Atlantic and Pacific farms, and also locating the water-pipe lines on the Atlantic farm.

Transmission towers settlement.—A closed circuit of Y levels was run over the transmission line towers between Balboa and Diablo Hill for settlement in September and May.

Miraflores steam plant.—Elevations were established for various points at the Miraflores steam plant under the direction of the electrical division.

Hydrographic tower, Cristobal.—A true azimuth line was carried over from old wireless tower No. 2, and a true north and south line established by tacks set in the platform of the tower.

Submarine power cable.—A survey was made in connection with relaying a part of the submarine power cable to Toro Point. The spar buoys for marking the location of the cable across Limon Bay were located by intersections and a map prepared showing the data necessary for picking up the cable at a future time.

Machine lathe, Balboa.—Lines and grades were given to a high degree of accuracy for placing the 65-foot turning lathe in building No. 1, Balboa shops.

Breakwater.—Cross sections were taken every 50 feet on both the east and west breakwater, the sections plotted and traced.

Examination.—An examination for levelmen and transit men was given on September 24.

Balboa dry docks.—Assistance was rendered in making the pump tests at the Balboa dry docks.

Area canal channel.—The area of the canal channel from the locks to the coasts at both ends was found to be 0.85 square mile.

Odd jobs.—Tests were made of 24 transits, 1 theodolite, 12 levels, and 1 plane table for points of design and construction as follows: Clear aperture, aberration, magnifying power, objective slide, definition, flatness and size of field of view, sensitiveness of the telescope and plate bubbles, eccentricity of centers and verniers, and fineness of cross hairs.

The stadia interval was determined for three transits and one plane table.

A boathouse was built at Gamboa and runways constructed to the water. Two cayucas were repaired.

In settlement of a controversy, the amount of coal delivered by the Panama Railroad Company into the bunkers of Pinel Bros.' steamer *Panama* was measured.

Assistance was rendered in computing excavation yardage on the Mount Hope and Diablo Hill borrow pits and in giving intersections for driving piles for the construction of the launch landing at Cristobal.

Maps.—A tracing was made for the Panama Government showing the 100-foot contours and shore lines and the monuments in the Rio Trinidad Valley; the 100-foot contour survey corrections were plotted onto the 1:20,000 map, also topography from the land-defense maps; a new tracing was made of the triangulation station data; the 5-mile Zone line was plotted onto the Harrison-Arosemena map.

Miles of line.—Transit, 71.28; Y level, 290.05; precise level, 2.37; stadia traverse 130.77; side shots, 154; pocket compass, 19.49; trail and trocha, 113.5; total miles of line, 781.86.

SECTION OF OFFICE ENGINEER.

This section has continued with the preparation and production of all construction plans for the building division, electrical division, locks' division, municipal division, and the terminal construction work on the Atlantic and Pacific coaling plants and dry dock No. 1. This section has also handled the miscellaneous drafting work required from time to time by other departments and divisions of the canal.

The details of the work accomplished and of the force employed are given in the report of the office engineer, which follows:

SECTION OF OFFICE ENGINEER.

C. J. Embree, Office Engineer.

During the year we have had an average of 32 draftsmen in this organization, an average of 3 men being on leave, leaving an active drafting force of about 29 men, the majority of whom were engaged upon work for the building division.

The number of drawings issued and assigned vault file numbers during the year is as follows:

Building division	1,007
Electrical division	106
Terminal construction	64
All other divisions	87
Total	1,264

This is an average of $43\frac{1}{2}$ tracings per man per year.

We have drawn drafting-room supplies from the storehouse in the amount of \$847.40, an average of 15.22 cents per man per working day during the year, these supplies including tracing cloth, tracing paper, pencils, ink, etc.

We have issued all blue prints, white prints, and vandyke negatives required by the various divisions of the canal connected with this office, the total quantities produced and issued being as follows:

	Square feet.
Blue prints	265,500
White prints	25,300
Vandyke negatives	12,000

It is estimated that there is a 10 per cent loss of paper, and that vandyke-negative prints take five times the labor required to produce blue prints. Upon this basis our prints have cost us as follows:

Blue prints:	Per square foot.
Labor	\$0.61
Material	.66
Total	1.27
Vandyke negatives:	
Labor	3.07
Material	2.32
Total	5.39

This office has continued to issue specifications and requisitions for all spare and maintenance parts for the lock machinery and equipment, as well as maintaining an index to all such parts being held in stock.

TERMINAL CONSTRUCTION WORK.

ATLANTIC DOCKS.

T. B. Monniche, Engineer of Docks.

The work performed by the division of the engineer of docks during the fiscal year 1916-17, including both design and construction work, was continued under the supervision of Mr. T. B. Monniche, engineer of docks, assisted in office work and preparation of plans by Mr. F. W. Blackwood, assistant engineer, and Mr. W. G. True, junior engineer, with the necessary clerks and draftsmen; also by Mr. C. A. Nelson, supervisor, who was in immediate charge of all construction work.

PIER No. 7.

At the close of the fiscal year ending June 30, 1916, all work had been completed on the substructure of Pier No. 7, while on the floor the only work unfinished was the laying of paving brick, which was 20 per cent complete. The structural steel for the shed had been 95 per cent completed, and the concreting of the walls and columns 20 per cent completed. During July, August, September, and October of the fiscal year 1917 all work remaining to be done on Pier No. 7 was completed with the exception of the erection of the bronze grill work over the doors at both ends of the building. This work was not completed until February, 1917, due to the contractor's failure to deliver all material until the end of January, 1917.

Shed.—The erection of 4,410,672 pounds of structural steel for the shed was completed on September 30, 1916. This steel was furnished by Milliken Bros., of New York, at a contract price of \$0.02309 per pound, amounting to a total of \$101,842.42, delivered at Cristobal.

Regarding the erection of the shed steel it was decided to allow local contractors to bid on this work, together with the superintendent of erection of The Panama Canal, who bid on the part of the Government. Mr. J. O. Childers was the only contractor to bid, and his bid was for \$10 per ton, whereas the bid of the superintendent of erection was only \$7.50 per ton. In view of this the work was performed by the erection forces of the canal. The actual cost of the erection was \$32,078.23, or approximately \$14.58 per ton. This high cost was partially due to the slow delivery of steel from the States, which made it impracticable to put a full force of men on the work until several months after the first delivery of steel had been received.

The total cost of the steel shed in place, including all charges from other divisions as well as work and material performed by the division of engineer of docks, was \$159,934.77 for the total weight of 2,207 tons.

Cement roofing tile.—The laying of tile by the American Cement Tile Manufacturing Company was started on June 7, 1916, and completed on September 19, 1916, 168 squares, or 10 per cent of the total, being erected during the fiscal year 1915-16 and the remainder of the total of 1,701 squares during the fiscal year 1916-17.

The cement tile for Pier No. 7 was manufactured on the Isthmus by the above-mentioned company in connection with the manufacture of 1,121 squares of tiling by the same company for buildings other than Pier No. 7.

The contractor was paid approximately \$30,600 for the 1,701 squares of tiling erected on Pier No. 7, including the contract price of \$3 per square for erection only.

Steel doors.—The type of doors adopted on Pier No. 7 was that furnished by the J. Edward Ogden Company, of New York. A total of 80 large doors were used as side doors, two doors divided by a swinging column being used at each 45-foot opening. At each end of the building one small door of the same type as the large doors was used.

The contract price for the doors completely erected was \$71,988.80. The assembling and erection of the doors started on May 22, 1917, and was completed on September 25, 1917.

Concreting of walls and columns.—The concreting of the walls and columns for the shed of Pier No. 7 was 13 per cent complete at the end of the fiscal year 1915-16, by which time 308 cubic yards of concrete had been placed. During July, August, and the first half of September 2,039 cubic yards of concrete were poured, making a total of 2,347 cubic yards used. This work was completed on September 16, 1916, and the cost per cubic yard, including forms and reinforcement, was \$22.88, or a total cost of \$53,700.66. The method of construction is illustrated by Plate No. 19.

Paving.—At the close of the fiscal year 1915-16, 279,000 paving brick had been laid on the floor of Pier No. 7, making this class of work 20 per cent complete. All paving work was completed by September 30, 1916, by which date a total of 1,381,000 bricks had been laid.

The paving bricks were furnished by the Murphysboro Paving Brick Company, of Murphysboro, Ill., at a unit price of \$38.84 per thousand delivered at Cristobal. The total cost of the pavement in place was \$68,011.16.

Pier No. 7 was first used for commercial purposes on September 20, 1916, when the steamship *Ucayali* was berthed and unloaded.

The completed pier is illustrated by Plate No. 20, on which will be noted the incomplete cylinders in the foreground upon which the port captain's launch house is to be built.

FILL AND TRACK YARD IN REAR OF THE CRISTOBAL FIRE STATION.

The work of laying the tracks on the new fill in the rear of the Cristobal fire station was started on June 28, 1916, and completed on March 24, 1917, after a considerable delay due to the slow delivery of ties and other track material.

The new track yard contains a total length of 14,185 lineal feet of track, and has a capacity of approximately 122 cars.

A total of 7,400 cubic yards of armor rock were used for armoring the new fill, of which 4,080 cubic yards were supplied from Sosa Hill, the remaining 3,320 cubic yards being recovered from the armor rock on the mole where the new fill joins the mole.

The armoring of the new fill was started in December, 1916, and completed on March 11, 1917.

EXTENSION OF THE CRISTOBAL MOLE.

The preliminary borings for the extension of the Cristobal mole which were started on February 9, 1916, and were 64 per cent complete at the end of the fiscal year 1915-16, were finally completed in September, 1916, a total of 22 holes having been drilled, consisting of 2,059 lineal feet of wash drilling and 176 lineal feet of diamond drilling.

On June 10, 1916, work was started on a trestle to be used for dumping soft rock for an extension to the Cristobal mole. By June 30, 1916, 547 lineal feet of trestle had been driven, and on August 16 this work was temporarily stopped with a total of 742 lineal feet of trestle in place. During the first half of February, 1917, a further extension of 68 feet was made, giving a final total of 810 lineal feet driven. The trestlework was started from the end of the mole as it was at the beginning of the fiscal year.

After completing the 742 lineal feet mentioned above, work was started on August 26, 1916, in the dumping of 119,414 cubic yards of soft rock from the Mount Hope borrow pit, to construct an extension to the mole. This work was completed in February, 1917. In addition to the 119,414 cubic yards of soft rock, 26,038 cubic yards of hard rock from Sosa Hill were placed along the north side of the mole extension as armoring. This work was started in January, 1917, and completed on March 17, 1917. The total cost of the fill was approximately \$93,633.67.

APPROACH FILL FOR PIER NO. 6 AND FILL FOR TRACK YARD.

The construction of the approach fill and fill for track yard for Pier No. 6 was started on June 12, 1916, and by the close of the fiscal year 1915-16 22,215 cubic yards of soft rock from the Mount Hope borrow pit had been dumped, and by December 31 of the fiscal year 1916-17 the work was completed with a total quantity of 129,448 cubic yards in place. The total cost of the fill in place was approximately \$45,327.42, or \$0.35 per yard. No armor rock was used in connection with this fill.

BOAT LANDING AND LAUNCH HOUSE BETWEEN PIERS NOS. 7 AND 8.

The driving of 1,058 lineal feet of 3-foot diameter steel cylinders and 1,049 lineal feet of 4-foot diameter cylinders was started on September 15, 1916, and completed on March 18, 1917, after several months' delay due to the late delivery of a part of the required amount of 3-foot diameter cylinders from the United States. All the required amount of 4-foot diameter cylinder material was secured secondhand on the Isthmus. The material for the 3-foot diameter cylinders, however, was supplied by the Riter Conley Company of Pittsburgh, Pa., at a contract price of \$0.0414 per pound delivered flat.

The excavation of the cylinders was started on September 27, 1916, and completed March 24, 1917, a total of 536 cubic yards having been removed.

The concreting of the cylinders was started in October, 1916, and completed on May 27, 1917, a total of 754 cubic yards having been poured.

The cost of the steel cylinders in place was \$11,746.64.

The cost of the excavation amounted to \$2,922.63, or approximately \$5.45 per cubic yard.

The cost per cubic yard of concrete in the cylinders was \$6.55, or a total of \$4,935.58, including all reinforcing.

The cost of the substructure complete, including surveys, preparation of site, designing and preliminary work, was \$23,270.83.

All work on the substructure of the boat landing and launch house was completed with the completion of the concreting of the cylinders on May 27, 1917. It has not been possible to do any further construction work on the boat landing, due to the fact that no floor steel has yet been received. The contract for this steel was awarded the J. B. Kendall Company, of Washington, D. C., who agreed to complete the shipments from their mill on or before April 1, 1917, and to deliver the material on the Isthmus at a unit price of \$0.0491 per

pound, or a total of approximately \$14,684.34, the estimated weight being 299,068 pounds.

The shed steel for the boat landing and launch house was furnished by the Belmont Iron Works, of Philadelphia, Pa. The total weight of 213,685 pounds was delivered on the Isthmus during April and May. This material was supplied at a contract price of \$0.06 per pound, or a total price of \$12,821.10.

CONCRETE BLOCKS FOR THE EAST BREAKWATER.

During August, September, and October of the fiscal year ending June 30, 1917, 2,203 concrete blocks were shipped to the east breakwater making a total of 4,000 blocks poured and delivered by this division. These blocks measured 4 feet 3 inches on a side and contained a total of 11,200 cubic yards of concrete. No reinforcing was used. The total cost of the blocks manufactured at site and loaded on cars ready for shipment to Coco Solo was \$41,653.56, corresponding to \$3.71 per cubic yard, or \$10.41 per block.

IMPROVEMENTS IN ROADWAYS AND NEW CUSTOM LINE FENCE.

On February 14, 1917, a work request was approved covering the expenditure of \$17,020 for new road work for the Cristobal docks. Work was started shortly afterwards and completed in April on a new 30-foot road for an entrance to the docks. The surfaces in front of Pier No. 8 and Dock No. 9 which were formerly grass plots were also concreted over, increasing to a great degree the traffic facilities of the docks. Likewise the macadam road alongside the electric charging station was concreted as were the areas in front of and alongside the new local freight house. In addition to the above a concrete road was constructed alongside the new track yard and parallel to the custom line fence for a distance of 286 feet from the new road entering the docks.

A new fence has recently been erected as a custom line fence for the docks. This fence was supplied by the Stewart Iron Works Co., of Cincinnati, Ohio, at a unit price of \$2.85 per linear foot, or \$2,580 for the 1,000 feet ordered. This fence was erected by this division, while the road work outlined above was performed by the municipal engineering division in accordance with plans prepared in the office of the engineer of docks.

PIER No. 6.

After a careful consideration of the best site for the construction of a new pier, on July 21, 1916, Authority for expenditure No. 920 was approved covering an expenditure of \$1,500,000 for the construction of Pier No. 6. The estimate upon which this Authority for expenditure was based was made in the office of the engineer of docks in August, 1915, and due to the short notice at which this estimate was required, it was assumed that the depth to rock and the material encountered would be the same as those for Pier No. 7. The borings, however, which were taken subsequent to the approval of Authority for expenditure No. 920 indicate that the total length of cylinders on Pier No. 6 will be 12 per cent greater than the total length of cylinders on Pier No. 7.

Dredging on site of Pier No. 6.—During the months of August and September, 1916, the dredging division performed 243,198 cubic yards of wet excavation on the site of Pier No. 6 which, at a unit cost of \$0.0628 per cubic yard, amounted to a total cost of \$15,273.89.

Final borings.—The final borings on the site of Pier No. 6 were started in September, 1916, and completed on January 24, 1917. A total of 93 holes were driven consisting of 6,602 linear feet of wash drilling. The total cost of the borings was \$2,496.69, or \$0.378 per linear foot.

Trestle and false work.—On September 2, 1916, a contract was awarded the J. G. Rainwater Lumber Co., of New Orleans, La., to furnish and deliver at Cristobal, Canal Zone, 545 yellow pine untreated 75-foot piles at \$0.46 per linear foot, or at a total cost of \$18,802.50. The delivery of the piling was started in November, 1916, and completed in January, 1917. The driving of the trestle was started in October, 1916, with piling secured on the Isthmus, and was completed with the piling furnished from the United States, in February, 1917. A total of 1,135 linear feet of trestle and false work were driven at a unit cost of \$36.23 per linear foot, and the total cost of the trestle and false work together with the necessary power and water lines and temporary tracks was \$47,489.17, or \$41.84 per linear foot of trestle.

Cylinders.—All caisson material was furnished from the United States with the exception of approximately 3,655 lineal feet of second-hand material secured on the Isthmus. The contract for 12,625 lineal feet, or 5,403,614 pounds, of steel caisson material was awarded the Riter Conley Co. on September 1, 1916, at a unit price of \$0.0337 per pound, or a total price of \$192,909, the material to be delivered flat.

The delivery of the caisson material was started in December, 1916, and completed in April, 1917.

The rolling and assembling of the caisson material was performed by the mechanical division at the Cristobal shops at a unit cost of \$4.206 per lineal foot, amounting to a total cost of \$53,105.31.

The driving of the cylinders was started on November 29, 1916, and at the end of the fiscal year 1916-17 was 65 per cent complete with a total of 15,855 lineal feet in place.

The excavation of the cylinders started about December 15, 1916, and at the close of the fiscal year was 63 per cent complete, 10,503 cubic yards of material having been removed.

The concreting of the cylinders was started on January 25, 1917, and at the close of the fiscal year was 44 per cent complete, a total of 10,987 cubic yards having been poured.

Due to the high cost of piling it was found that in case the same construction of four trestles as was used for Pier No. 7 should also be used for Pier No. 6 the increased cost of the foundation work for Pier No. 6 would be approximately \$100,000. This increase in cost is believed to be eliminated by the use of floating equipment in connection with but one trestle instead of four as was the case with Pier No. 7. Accordingly derrick barges *Nos. 156, 157, and 161* were transferred to this division to be used in setting, driving, excavating, and concreting the cylinders. The concrete-mixing plant is mounted on derrick barge *No. 161*, while derrick barges *Nos. 156 and 157*

perform the other work mentioned above in connection with other equipment mounted on pontoons or running on the trestle.

During the first half of the fiscal year plans and specifications were prepared for the structural steel and miscellaneous ironwork for the floor system of Pier No. 6. The total estimated weight of 11,059,050 pounds included the predominating weight of 10,444,000 pounds of structural work. Bids were advertised for during January and February of 1917 and opened on February 12, 1917. The lowest bidder proved to be the United States Steel Products Co., whose bid A amounted to a total of \$574,886.48 for the material delivered in Cristobal and whose bid B amounted to \$639,218.48 for the material delivered and erected. Under bid A (i. e., not including the erection) the unit price for the structural steel was \$0.052 per pound and under bid B the unit price was \$0.056 per pound.

As the cost of the steel in place on Pier No. 7 was only \$0.0227 per pound as compared to the above-mentioned bid of \$0.058 per pound for Pier No. 6, an increase in cost of the floor of Pier No. 6 over that of Pier No. 7 amounting to \$368,000 would result if the same construction were to be used as was used on Pier No. 7. Investigation showed, however, that a considerable reduction of this increase in price could be effected by the elimination of the structural steel floor system and the use of reinforced concrete. It is believed that the estimated total of 25,000 cubic yards of reinforced concrete required by the use of reinforced concrete construction instead of structural steel can be put in place for \$17.50 per cubic yard, or a total of \$436,000, which together with \$89,000 worth of steel struts already ordered would make a total cost of \$525,000. The cost of the floor system on Pier No. 7 was \$413,000, so that an estimated increase in the cost of floor of Pier No. 6 of \$112,000 will result, instead of \$365,000, which would have been the case if the same construction were to be used as was used on Pier No. 7.

The redesign of the floor for Pier No. 6 has necessitated corresponding changes in the design of the shed, which it was originally intended to construct as nearly as practical identical to the shed of Pier No. 7.

Effective December 1, 1916, this division was transferred by Circular No. 660-31 from the Panama Railroad Co. to The Panama Canal, department of operation and maintenance.

It is expected to complete all work on the cylinders of Pier No. 6 not later than November 15, 1917, and to complete the work on the concrete floor by May 1, 1918, at which date the paving of the floor may be started. Provided no delay may be encountered in securing the shed steel, all deliveries should be completed by August 1, 1918, and the erection by November, 1918. It is believed that all work on the pier, including the concreting of the walls and the erection of the doors, will be completed on or before December 31, 1918.

PACIFIC TERMINALS.

A. R. Brown, Assistant Engineer.

DRY DOCK No. 1.

Miscellaneous work was done, consisting of completing installation of pipe lines and drains around dock coping, and manholes therefor;

grading and paving of area around dock; placing of concrete walk around pump and compressor house; installing fittings at dock coping, and check valves in culverts to prevent "geysers" at coping drain down spouts which enter flooding culverts. Pump pit was also made water-tight and cut-off wall added to bulkhead at station 10 to prevent seepage into backfill around dry dock.

The miter gate operating machinery was completely installed and wiring completed. These electrically operated machines have proven a remarkably successful innovation for dry docks, being duplicated from the lock gate operating machinery.

Capstans and bollards were completely installed and capstans accepted after minor alterations thereto. The capstans have operated satisfactorily.

Handrails were completely installed and have proven satisfactory.

The blocking system, with some modifications, was installed as originally designed, and presents a new feature in dry dock installations, as regards the holding-down device for the docking keel blocks, which was described in the last annual report. The device has proven practical and securely holds the blocks in any desired position.

The 50-ton locomotive crane was completely erected, tested, and accepted, having met the tests satisfactorily except in a few minor points. The crane was furnished by the American Hoist & Derrick Co., of St. Paul, Minn.

The design, fabrication, and erection of steelwork for wharf C-D-E was completed and the decking installed by the municipal engineering division.

The pumping machinery was completely installed, tested, and accepted, proving entirely satisfactory after minor adjustments had been made. The machinery is efficient and the plant is a very satisfactory installation.

Dry Dock No. 1 and all its accessories have been in satisfactory operation, and practically no work remains to be done except maintenance.

The construction of Dry Dock No. 2 was not advanced beyond the limits contemplated at the close of fiscal year 1916. The basin formed by cofferdam on north and dock wall on south side was opened for entrance of small craft.

COALING PLANTS.

Erection was completed. The official tests were run and the machinery accepted, subject to the operation of guaranty bonds required of the contractors. The plants are satisfactory except for some defects and the closing up of contract matters is in progress.

EAST BREAKWATER, COLON.

C. C. Snedeker, Superintendent.

The following is a report of operations on the Atlantic breakwaters for the months of July to December, 1916, to complete the work at the east breakwater:

Dry Fill.—Derrick barges *Nos. 156 and 157* continued the work of placing concrete blocks in the top section and to finish the fill. From

July to October there were placed 10,055 blocks, containing 81,156.1 cubic yards, as follows:

	Number of blocks.	Number of cubic yards.
Walker & Torbert contract, size 7 feet, 12.3 cubic yards.....per block..	3,659	45,015.7
Coco Solo production, size 6 feet 3 inches, 9 cubic yards.....do.....	2,093	18,837.0
Cristobal coaling station production, size 5 feet 3 inches, 5.3 cubic yards....do.....	2,102	11,140.6
Panama Railroad production, size 4 feet 3 inches, 2.8 cubic yards.....do.....	2,201	6,162.8
Totals.....	10,055	81,156.1

The unit cost for placing, by means of derrick barges, a total of 147,056.1 cubic yards of concrete blocks to complete the east breakwater was \$0.3318 per cubic yard.

Wet fill.—The dredge *Marmot*, working at the Cristobal coaling station, excavated 46,350 cubic yards of material classified as earth, small rock, and blue rock. This material was dumped on the harbor slope of the extension by scows, and the wet fill was completed August 14, 1916.

Coco Solo production of concrete blocks.—One thousand three hundred and fifty-six concrete blocks containing 12,204 cubic yards, size 6 feet 3 inches, 9 cubic yards per block, were manufactured at the Coco Solo mixing plant to complete the requirements of the east and west breakwaters. In addition to this, 1,000 blocks, containing 9,000 cubic yards, were made for permanent storage. A total of 2,356 blocks were manufactured from July 1 to October 30, the mixing plant working 81 days of eight hours each, or an average of between 29 and 30 blocks per working day.

On account of rough weather during the first week of November it was decided to be more expedient and economical to unload and store 143 blocks which had been put into barges to be placed by derrick barges in the east breakwater fill than to hold the floating equipment inactive until smoother weather prevailed. Therefore the number of blocks in storage at the Coco Solo yard for future use, if required on the Atlantic breakwaters, is 1,143, containing 10,287 cubic yards. Derrick barges *Nos. 156* and *157* were then transferred to the Panama Railroad for use at Pier No. 6.

The unit cost of manufacture at Coco Solo for a total of 6,000 blocks, containing 54,000 cubic yards, was \$33.4379 per block, or \$3.7152 per cubic yard.

The unit cost of producing and putting into the east breakwater fill a total of 196,468.8 cubic yards of concrete blocks was \$3.9813 per cubic yard.

Miscellaneous.—From July 1 to November 30 work was continued in tearing up and removing the temporary trestle on the east breakwater, using derrick barge *No. 161* and crane *No. 61*. Approximately 10,726 linear feet of single-track trestle on the harbor (sea-side) extension and "L" were removed. The work of salvaging the trestle was completed on November 30.

The log sawmill sawed 953,273 feet b. m. of lumber from salvaged trestle material. This mill was transferred to the fortification division on December 31, 1916.

WEST BREAKWATER.

During the months of August, September, and October, 1916, 812 concrete blocks, containing 9,666.6 cubic yards, were manufactured, as follows:

	Number of blocks.	Number of cubic yards.
Walker & Torbert contract, size 7 feet, 12.3 cubic yards.....per block..	712	8,757.6
Coco Solo production, size 6 feet 3 inches, 9 cubic yards.....do....	101	909.0
Total.....	813	9,666.6

These were placed on the west breakwater to complete the repairs made necessary on account of damage done by the 1915 "northers." This portion of the work was finished on October 10, and the unit cost of producing and placing these blocks was \$1.2758 per cubic yard.

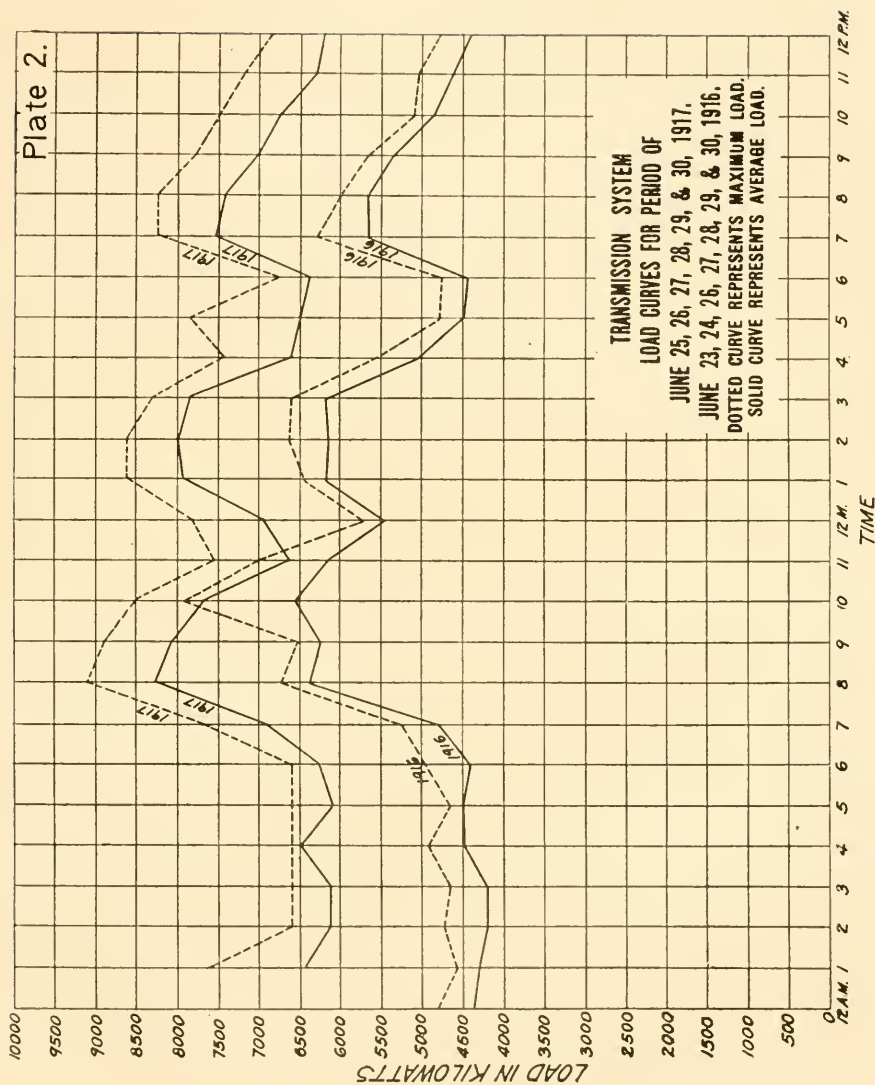
General.—The cleaning up of the work on the Atlantic breakwaters at Coco Solo was commenced in November and completed during the following month, the floating equipment, consisting of derrick barges, rock and sand barge, launch, and locomotive cranes, being transferred to other divisions. The property and material were also transferred and the accountability of the superintendent closed. The average daily force from July to close of the work in December was 22 gold and 159 silver employees. The remainder of the force at Coco Solo was disbanded and the work at the east breakwater completed.

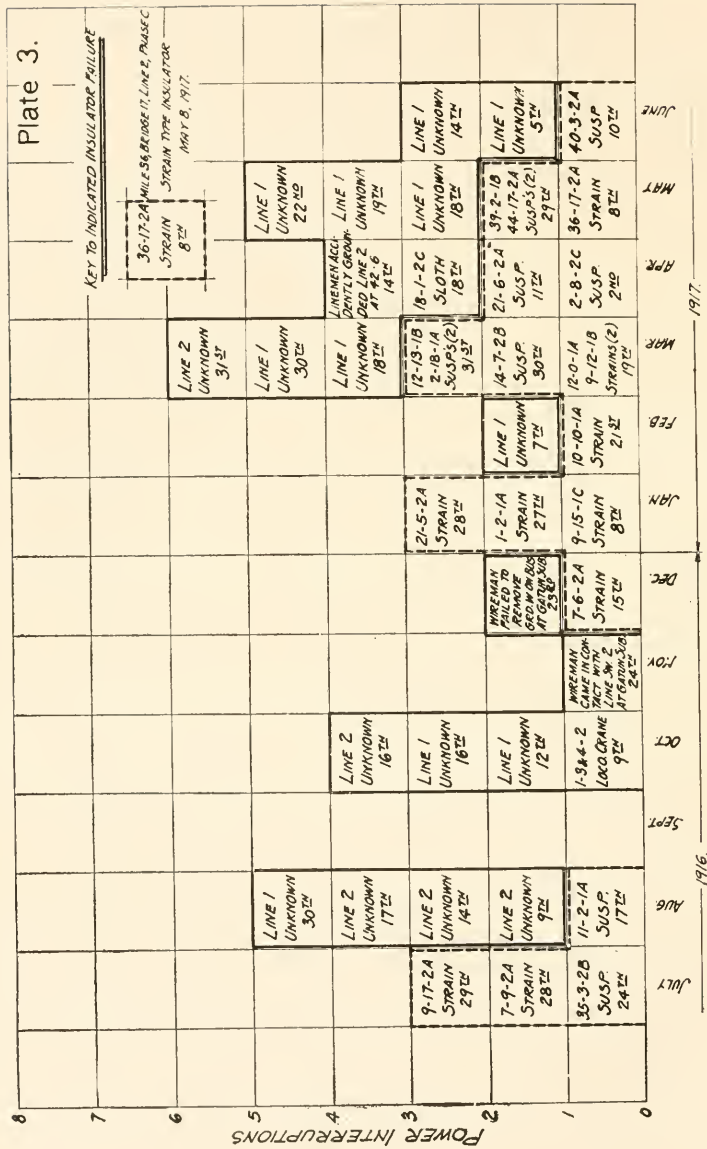
Respectfully,

JAY J. MORROW,
Engineer of Maintenance.

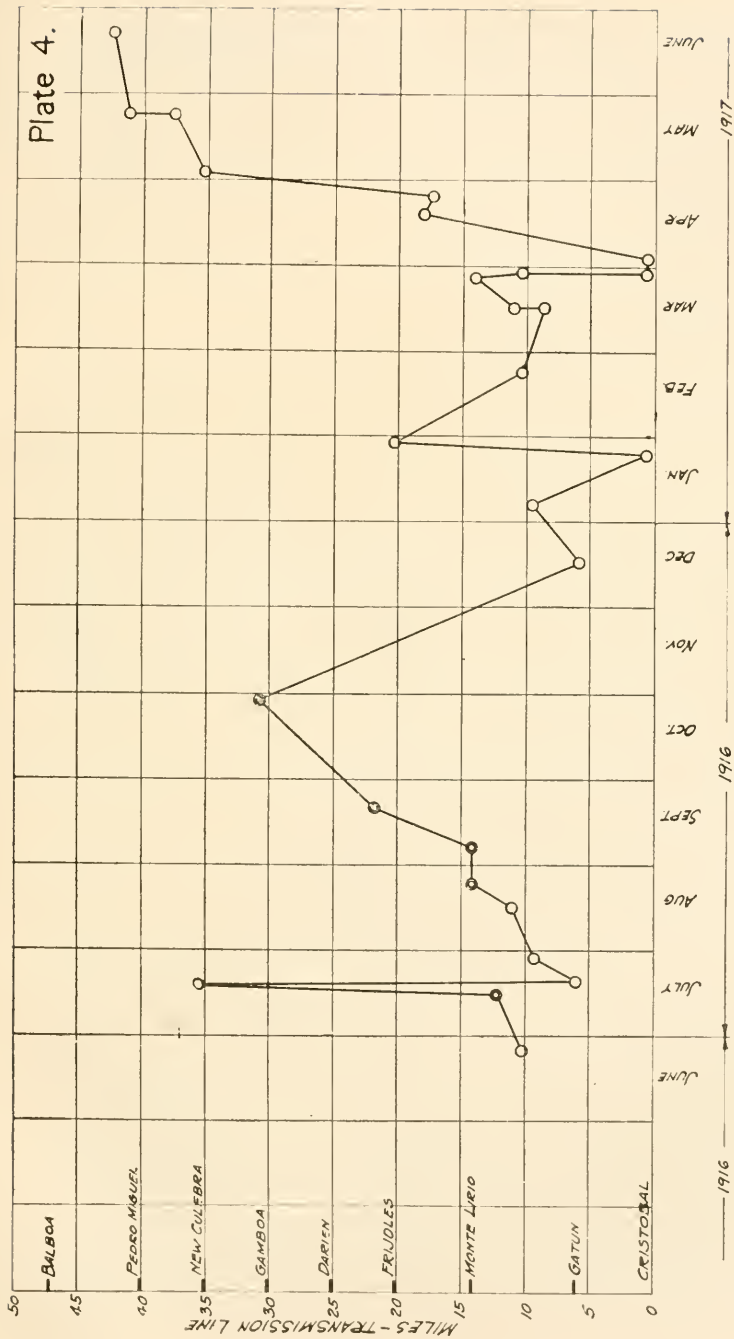
Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

Plate 2.

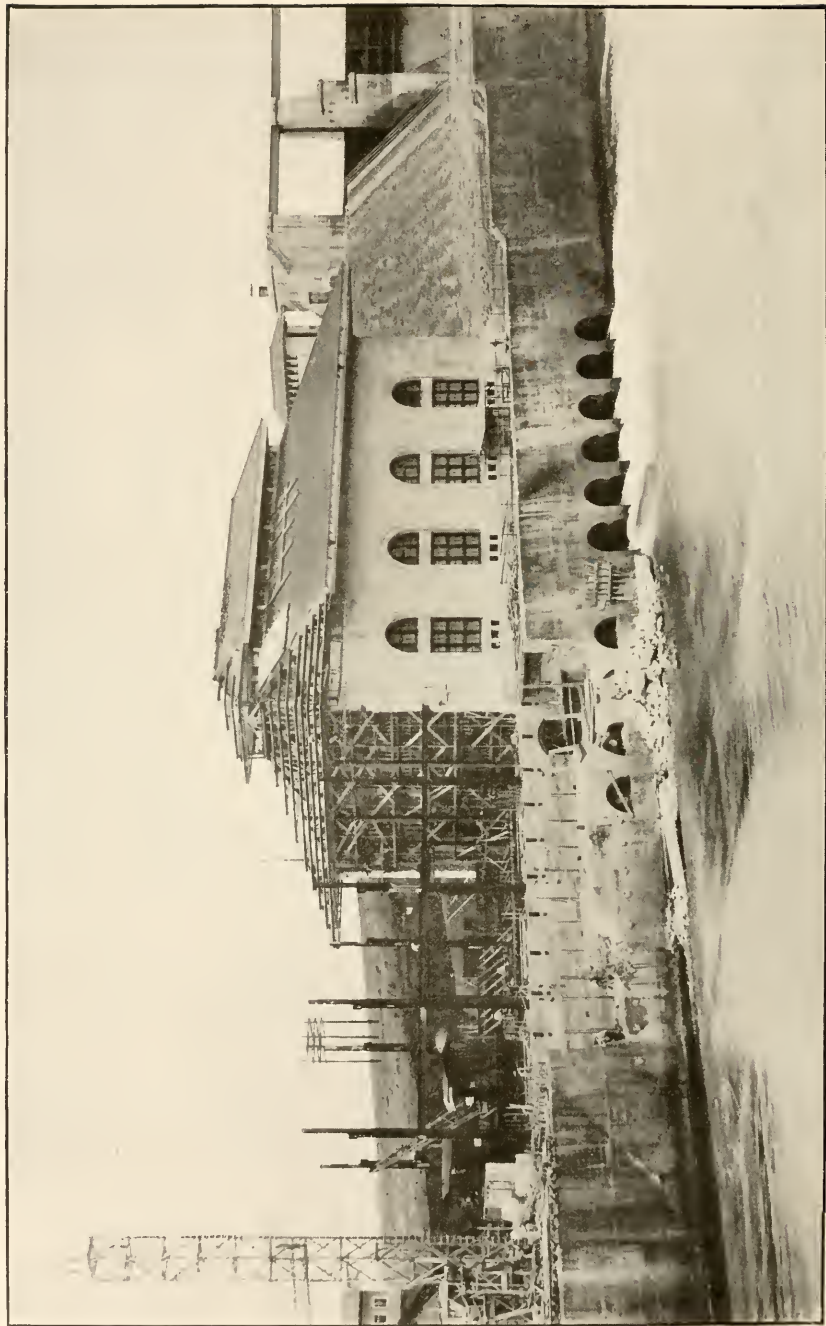




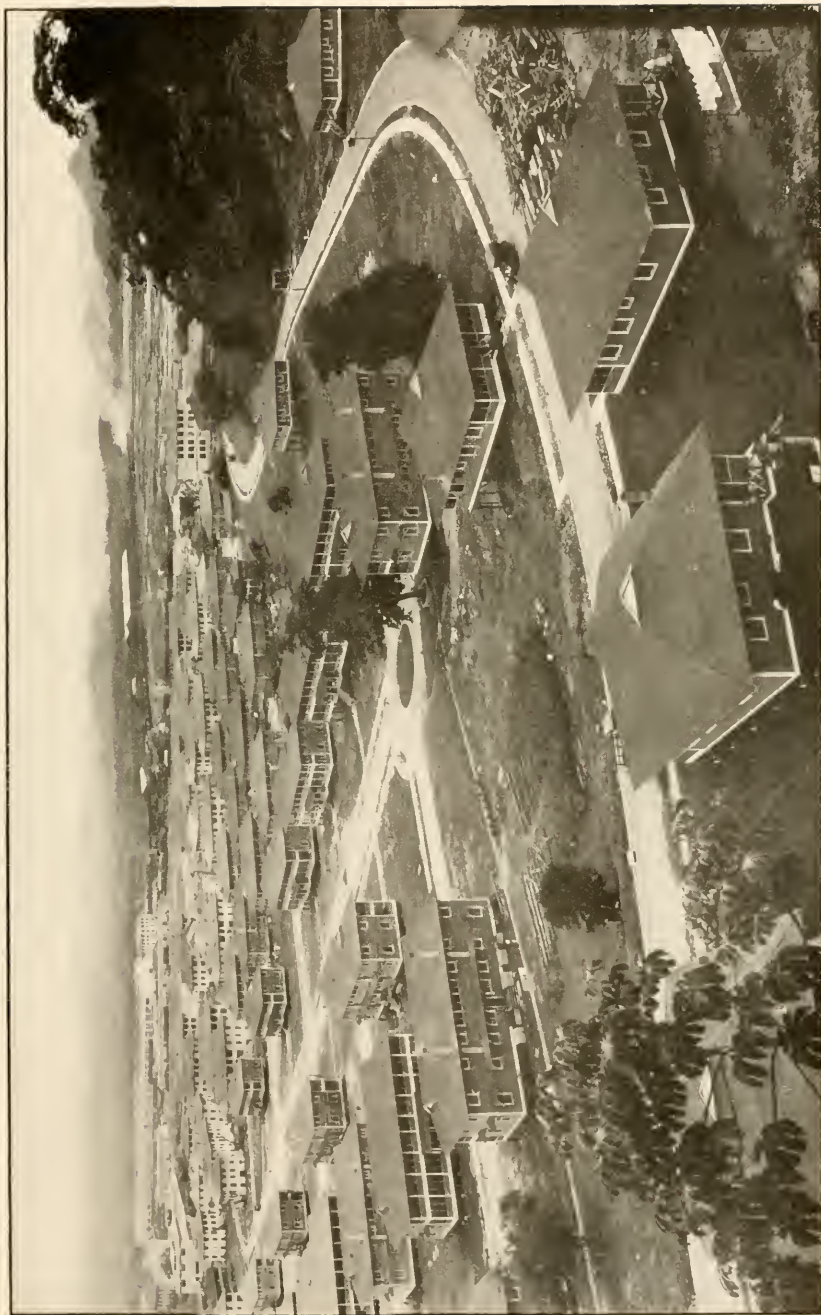
TRANSMISSION SYSTEM
CAUSES AND DATES OF POWER INTERRUPTIONS.
INTERRUPTIONS DUE TO INSULATOR FAILURES SHOWN IN AREA
UNDER DOTTED LINES.
INTERRUPTIONS DUE TO ALL OTHER CAUSES SHOWN IN AREA
BETWEEN SOLID AND DOTTED LINES.



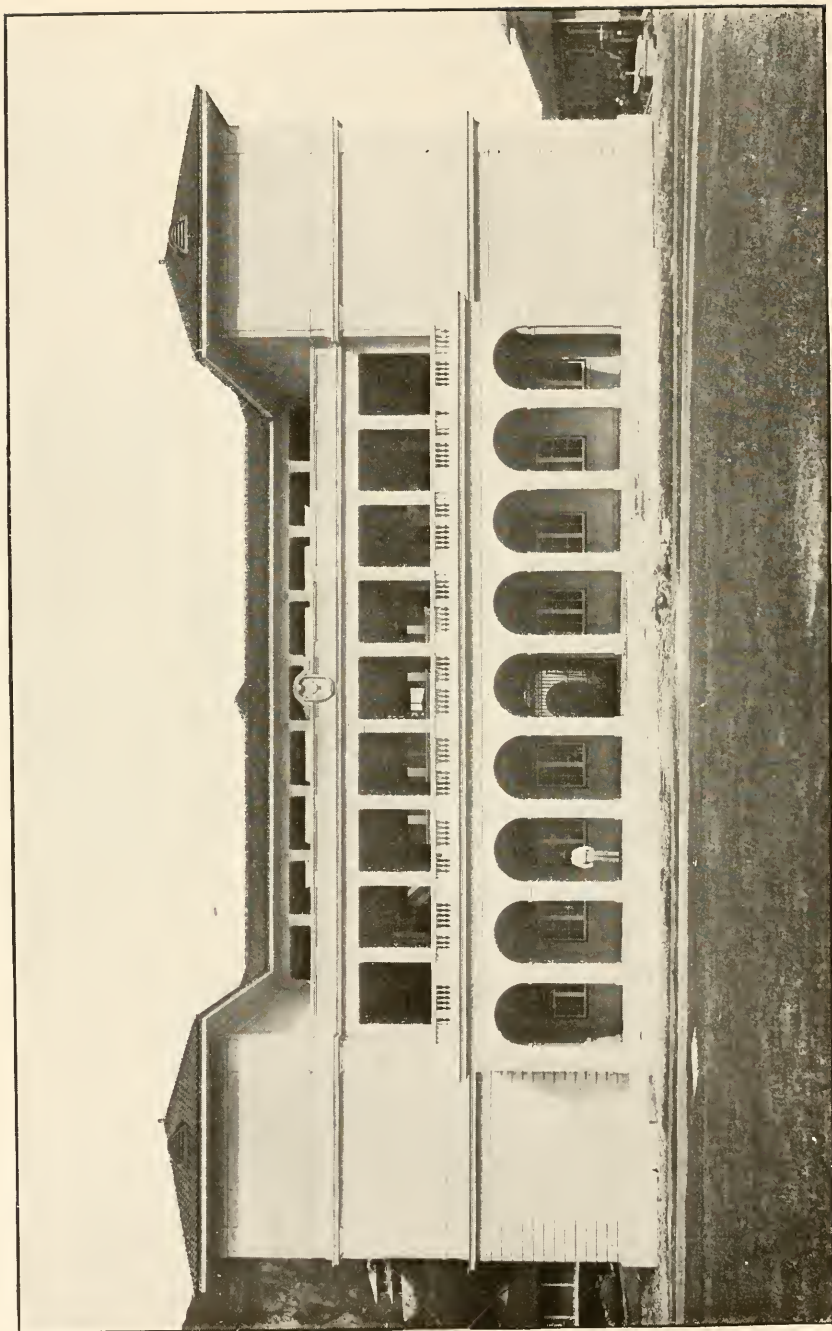
TRANSMISSION SYSTEM
LOCATIONS AND DATES OF INSULATOR FAILURES
TOTAL FAILURES, CAUSING POWER INTERRUPTIONS.
PARTIAL FAILURES, NOT CAUSING POWER INTERRUPTIONS.



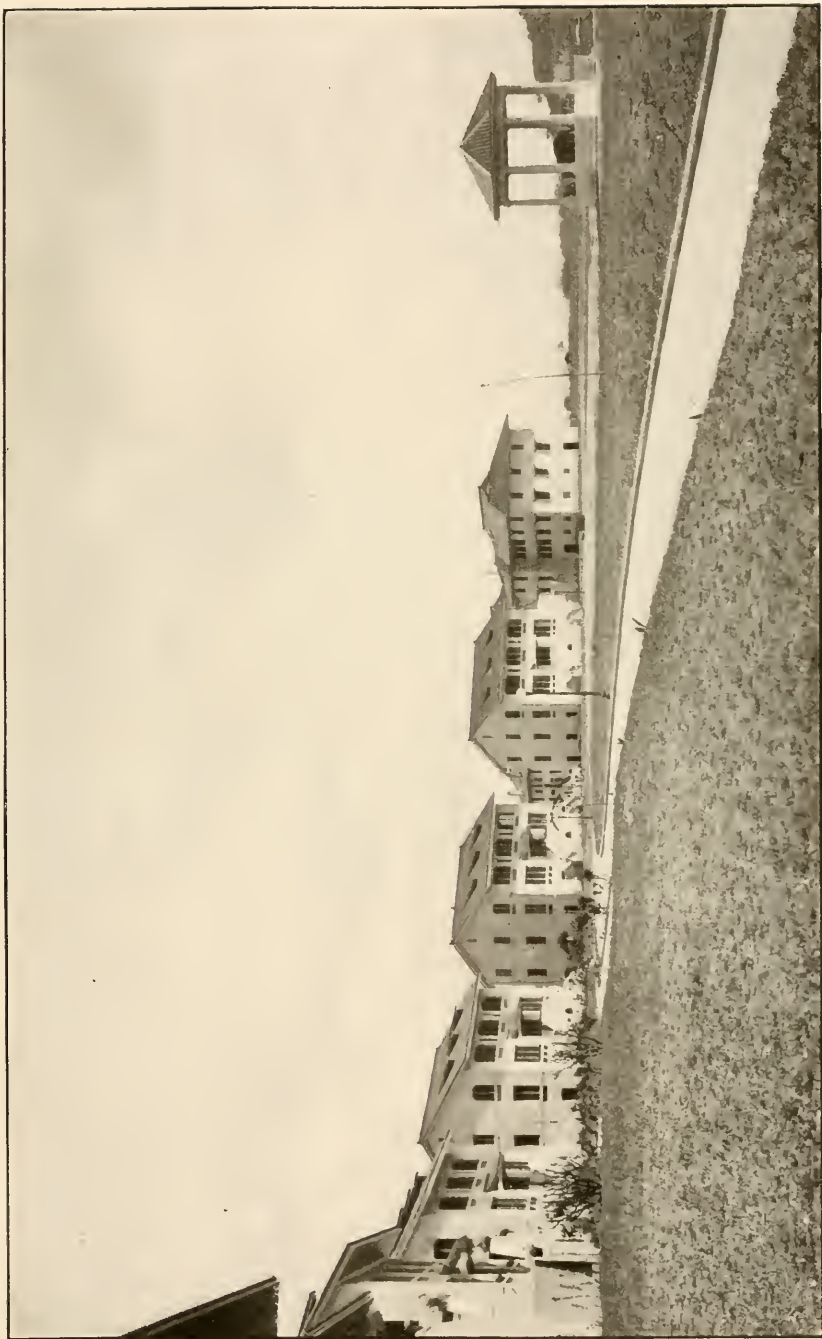
GATUN HYDROELECTRIC STATION. FROM WEST SIDE OF SPILLWAY, REMOVAL OF OLD WALL PREPARATORY TO BUILDING ARCH OVER TAIL RACE. JUNE 25, 1917.



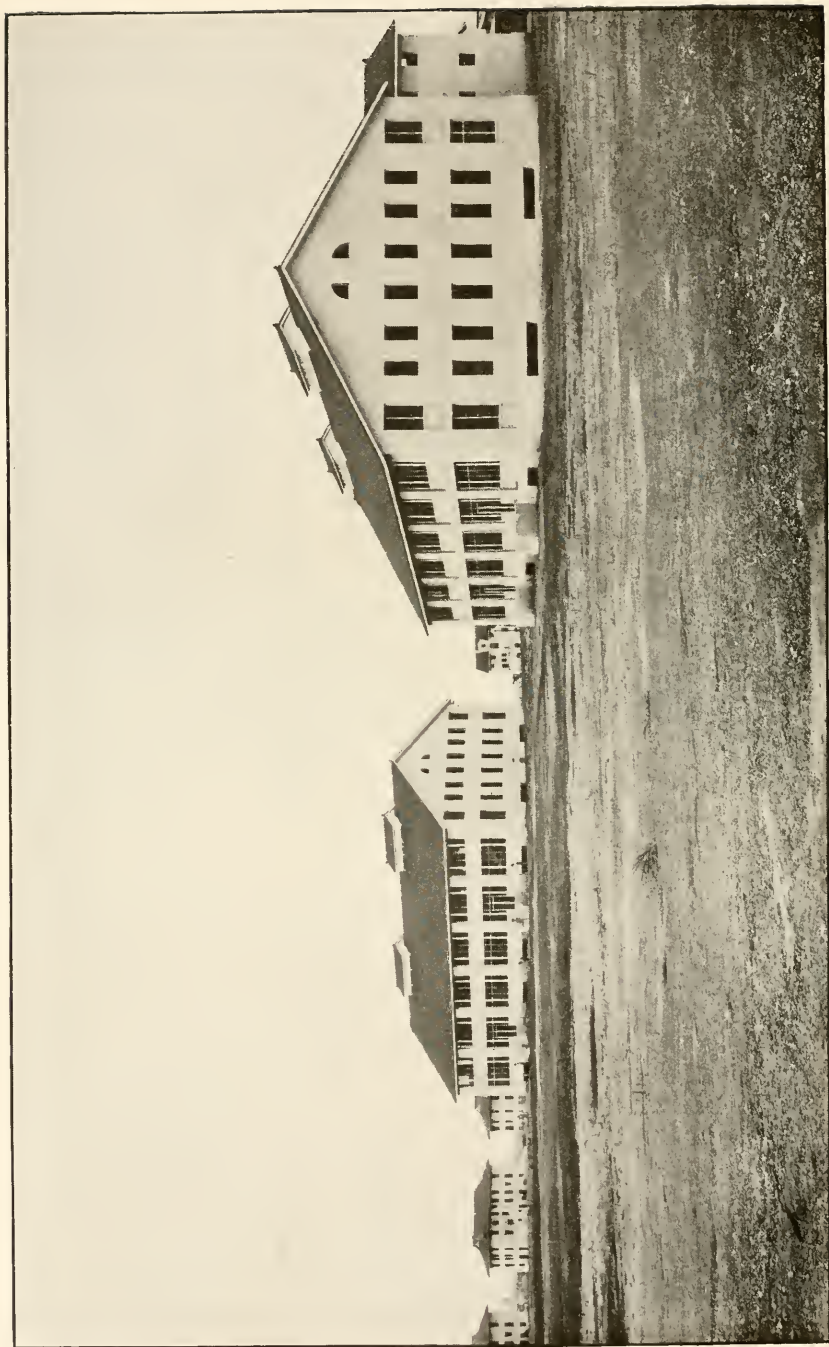
BALBOA. NEW QUARTERS. LOOKING NORTH. JULY, 1917.



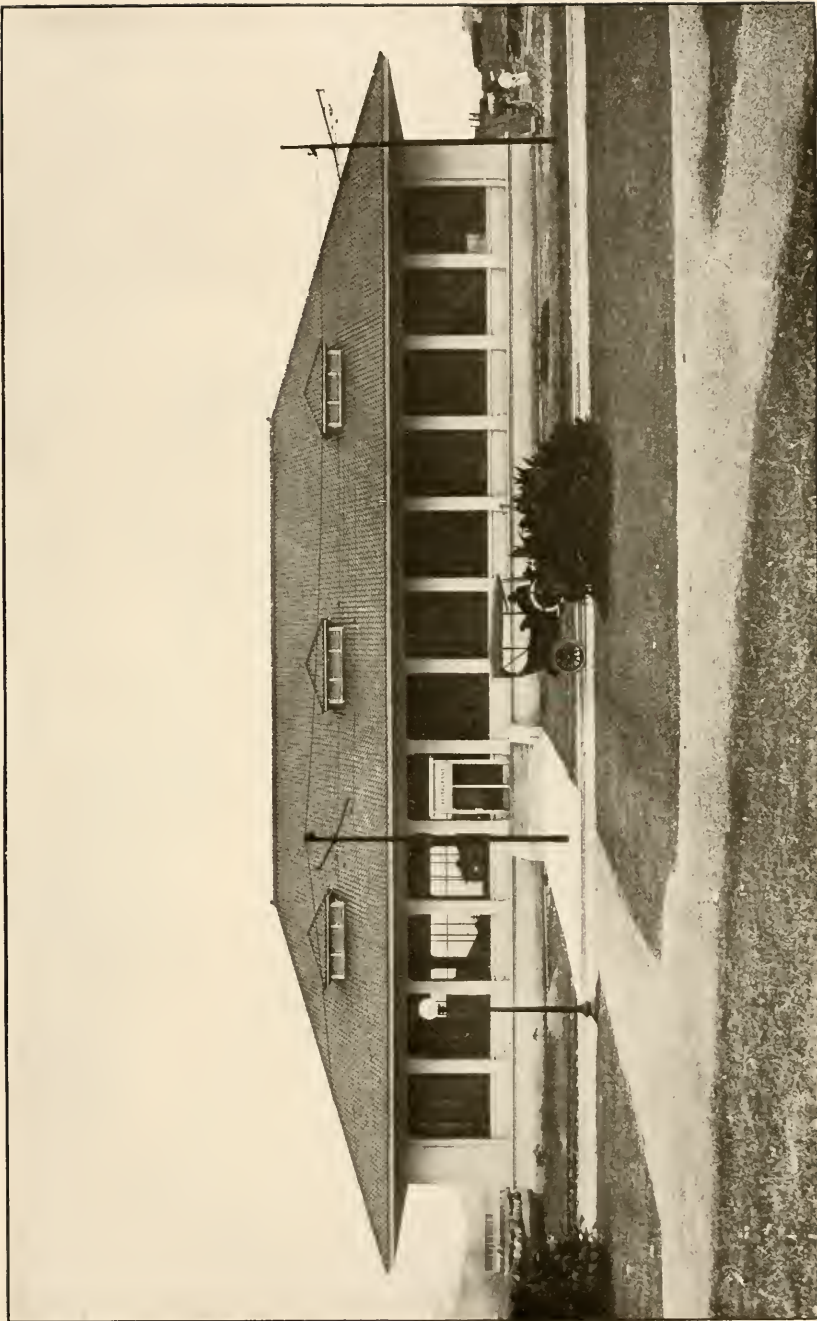
BALBOA SCHOOLHOUSE. JUNE, 1917



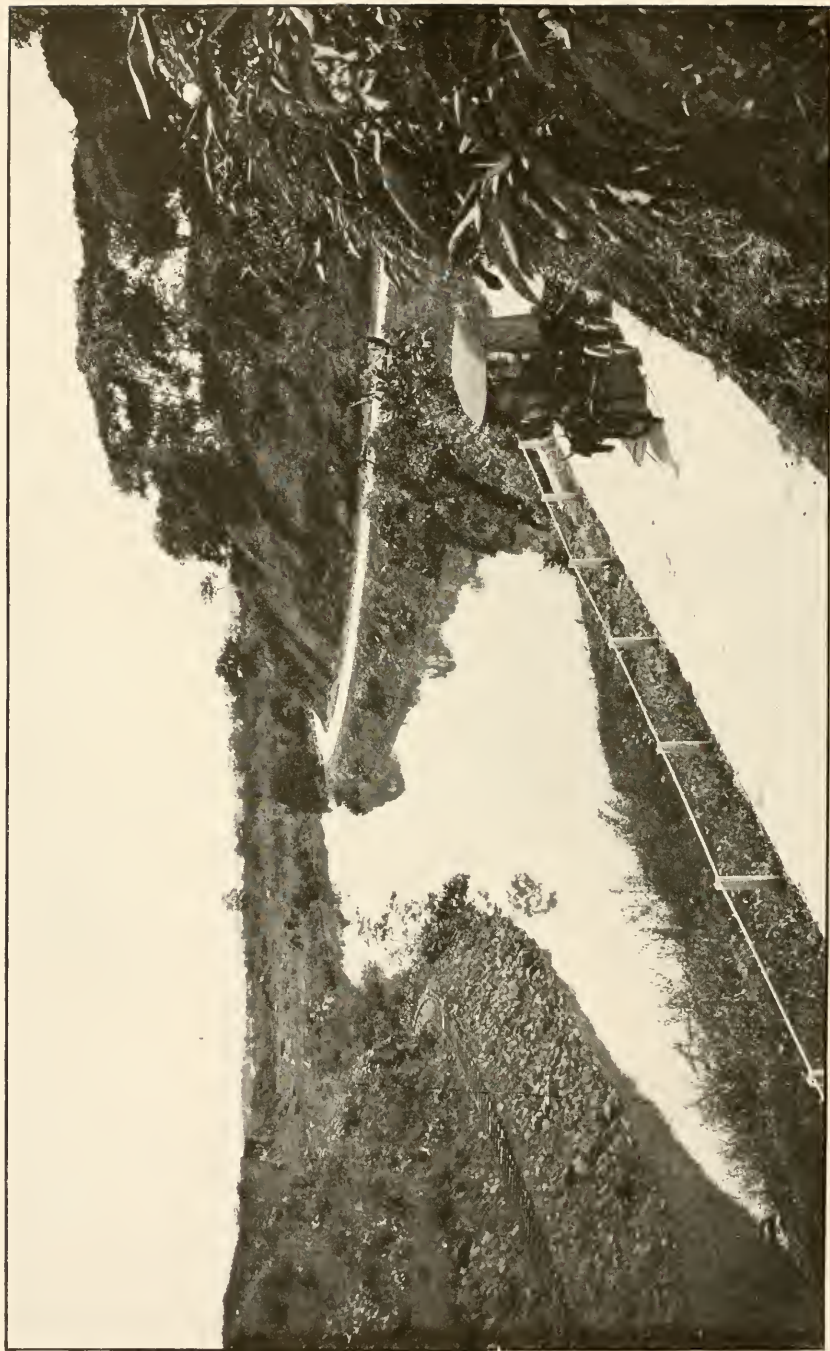
FORT GRANT. FIELD OFFICERS' QUARTERS. JUNE, 1917.



FORT GRANT. COMPANY BARRACKS. JUNE, 1917.



BALBOA. NEW CONCRETE RESTAURANT. JUNE, 1917.



ROAD FROM MOUNT HOPE TO MARGARITA POINT. JUNE, 1917.

THE PANAMA CANAL Plate 13.

Department of Operation and Maintenance
Division of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.

NOTE SINCE 1902, EXCEPT 1906, MEAN
MONTHLY DISCHARGES WERE TAKEN
FROM STATION DISCHARGE CURVES.
PREVIOUS TO MARCH 1907, ALL DIS-
CHARGES WERE MEASURED BY FLOATS.
SINCE THAT DATE CURRENT METER
MEASUREMENTS HAVE BEEN MADE.

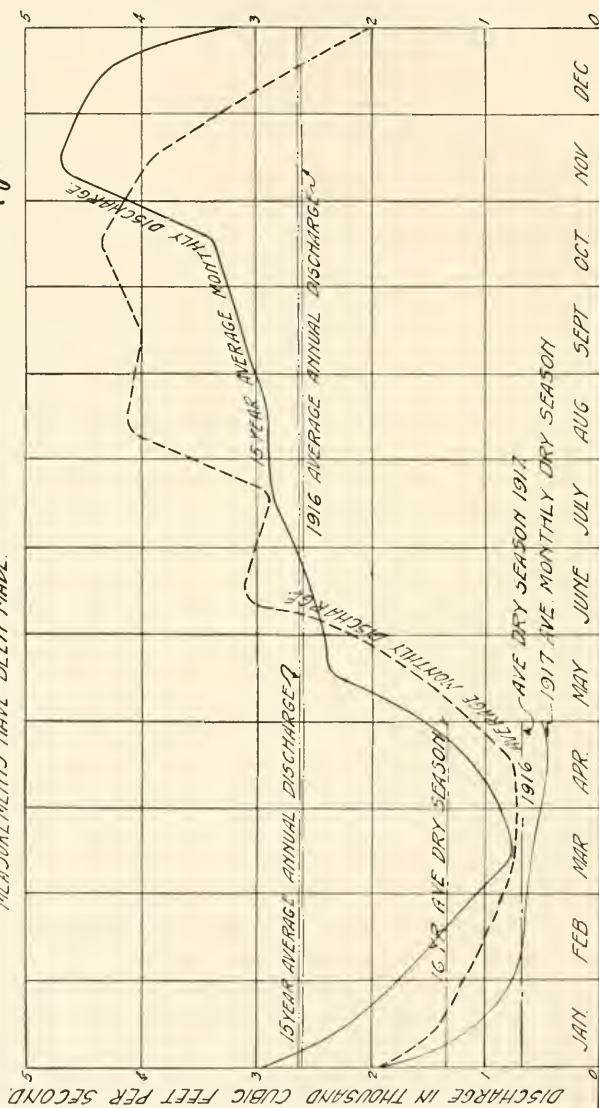
CHAGRES RIVER DRAINAGE BASIN

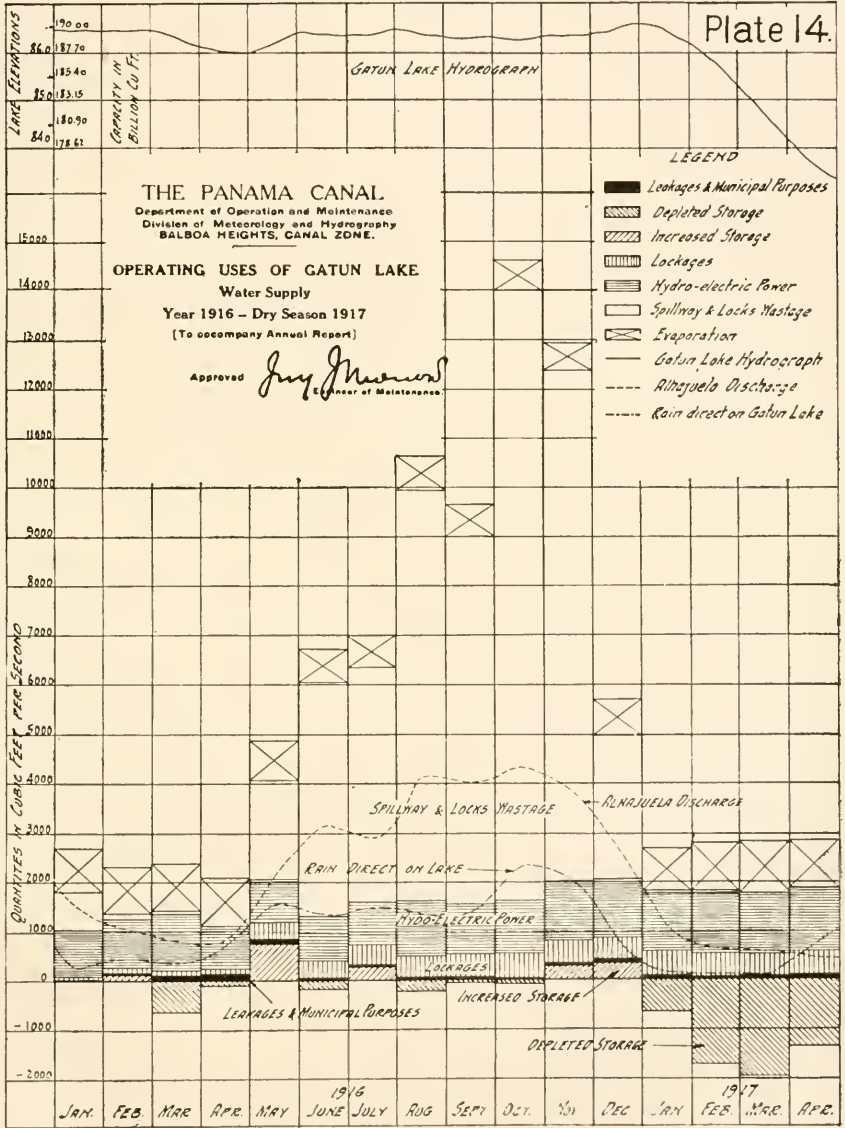
Area 427 Square Miles

Alhajuela Average Monthly Discharges
(To accompany Annual Report 1917)

Approved

Jay Mowat
Engineer of Maintenance





THE PANAMA CANAL

Department of Operation and Maintenance
Division of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.

GATUN LAKE WATERSHED

(Area 1320 Square Miles)

TOTAL YIELD MASSED

Maximum, Average, Current and Minimum Years

Period 1911 - 1916 Inclusive

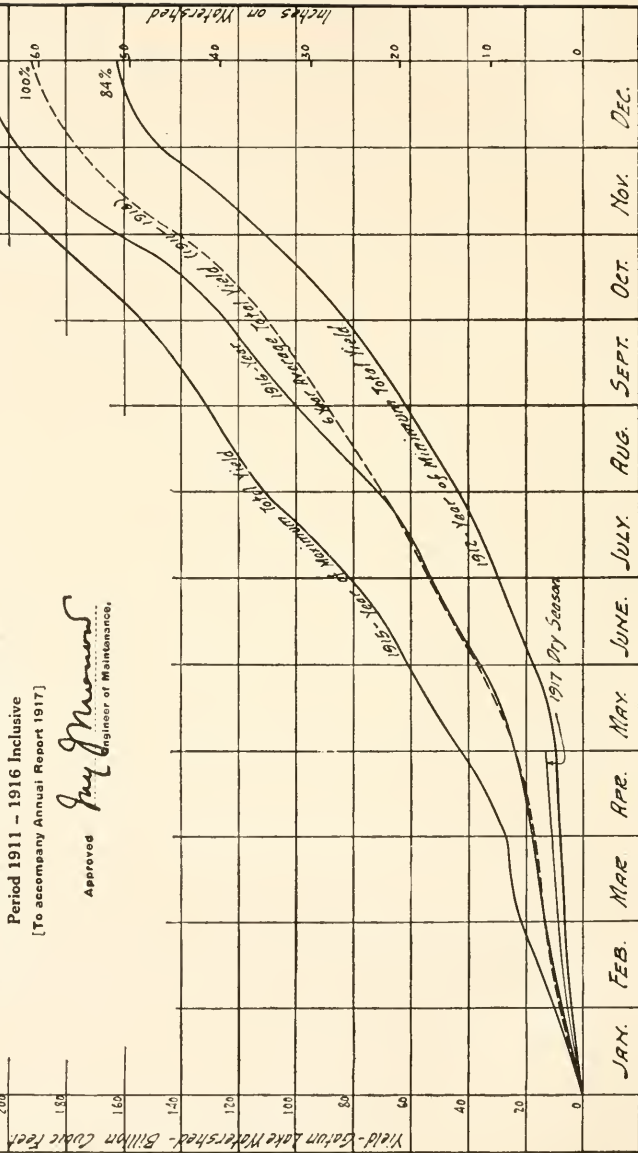
[To accompany Annual Report 1917]

Approved

Jay M. Mearns
Engineer of Maintenance

Plate 15.

NOTE: Total Yield is the sum of Lockages,
Leakages, Hydro-electric, Spillway change
in Storage, Evaporation, Municipal and
Sanitary Water



THE PANAMA CANAL
Department of Operation and Maintenance
Division of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.

GATUN LAKE WATERSHED

[Area 1320 Square Miles]

TOTAL YIELD FOR GATUN LAKE

Year 1916 -- Dry Season 1917

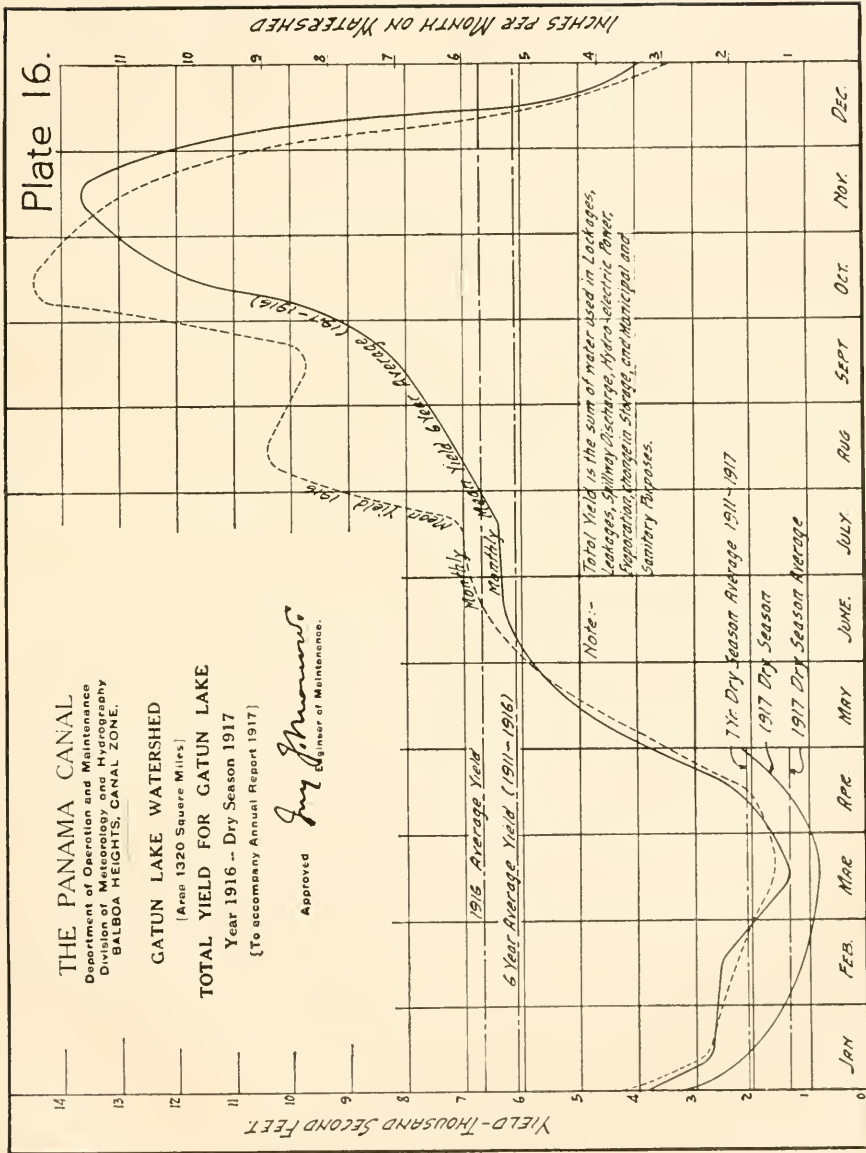
[To accompany Annual Report 1917]

Approved *J. J. Moore*
Engineer of Maintenance.

INCHES PER MONTH ON WATERSHED

Plate 16.

YIELD - THOUSAND FEET



THE PANAMA CANAL
 Department of Operation and Maintenance
 Division of Meteorology and Hydrography
 BALBOA HEIGHTS, CANAL ZONE.

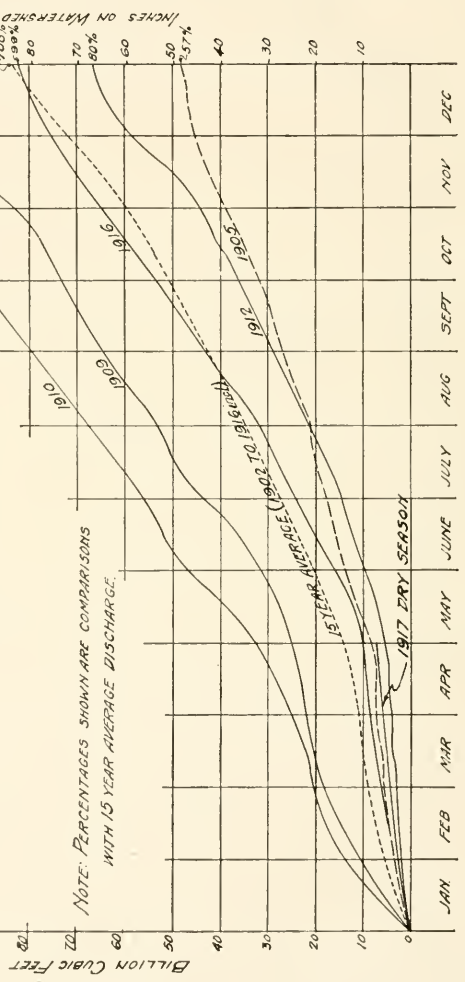
CHAGRES RIVER DRAINAGE BASIN
 [Area 427 Square Miles]

ALHAJUELA DISCHARGE MASS CURVES

- 1905 - Year of Minimum Discharge
- 1909 - Year of Maximum Discharge
- 1910 - Dry Season of Maximum Discharge
- 1912 - Dry Season of Minimum Discharge
- 1916 - Year
- 1917 - Dry Season only

[To accompany Annual Report 1917]

Approved *Jay M. Mendenhall*
 Engineer of Maintenance



THE PANAMA CANAL

Department of Operation and Maintenance
Division of Meteorology and Hydrography
BALBOA HEIGHTS, CANAL ZONE.

CHAGRES RIVER DRAINAGE BASIN

(Area 427 Square Miles)

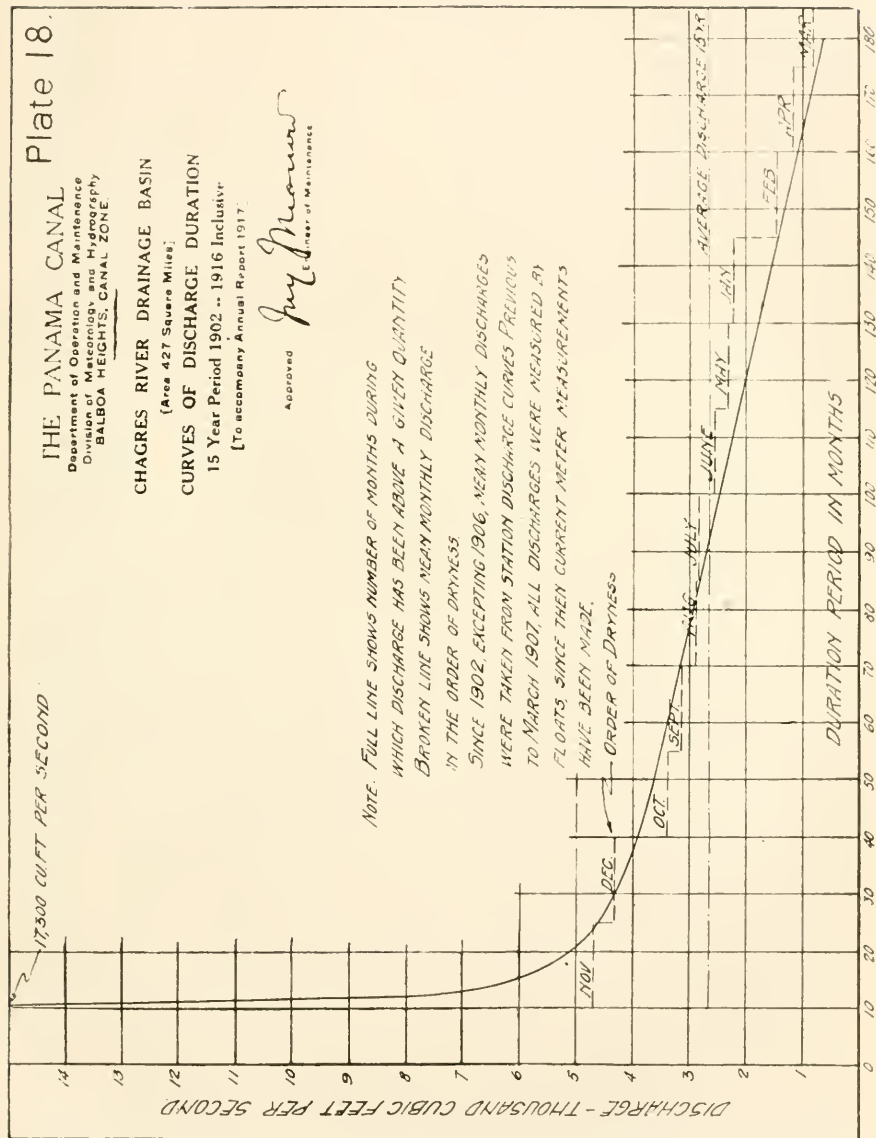
CURVES OF DISCHARGE DURATION

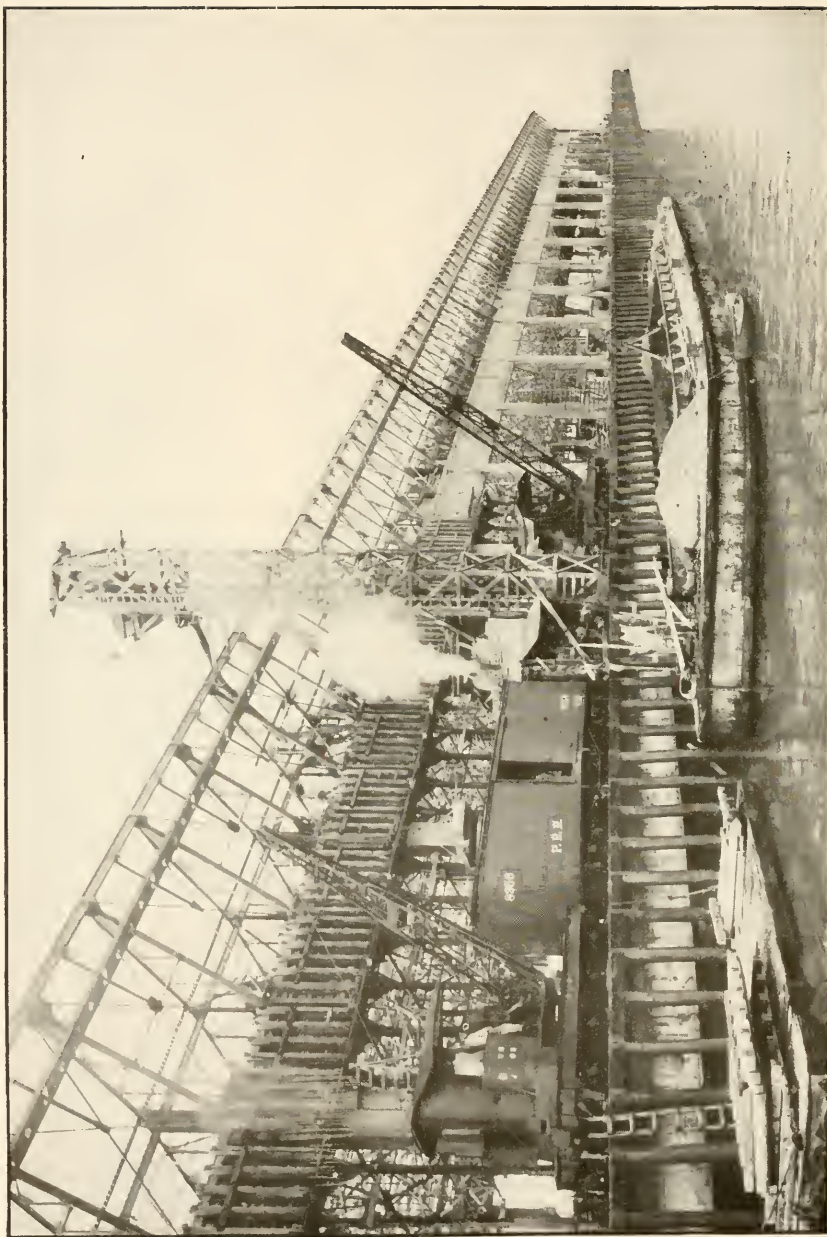
15 Year Period 1902 .. 1916 Inclusive

[To accompany Annual Report 1917.]

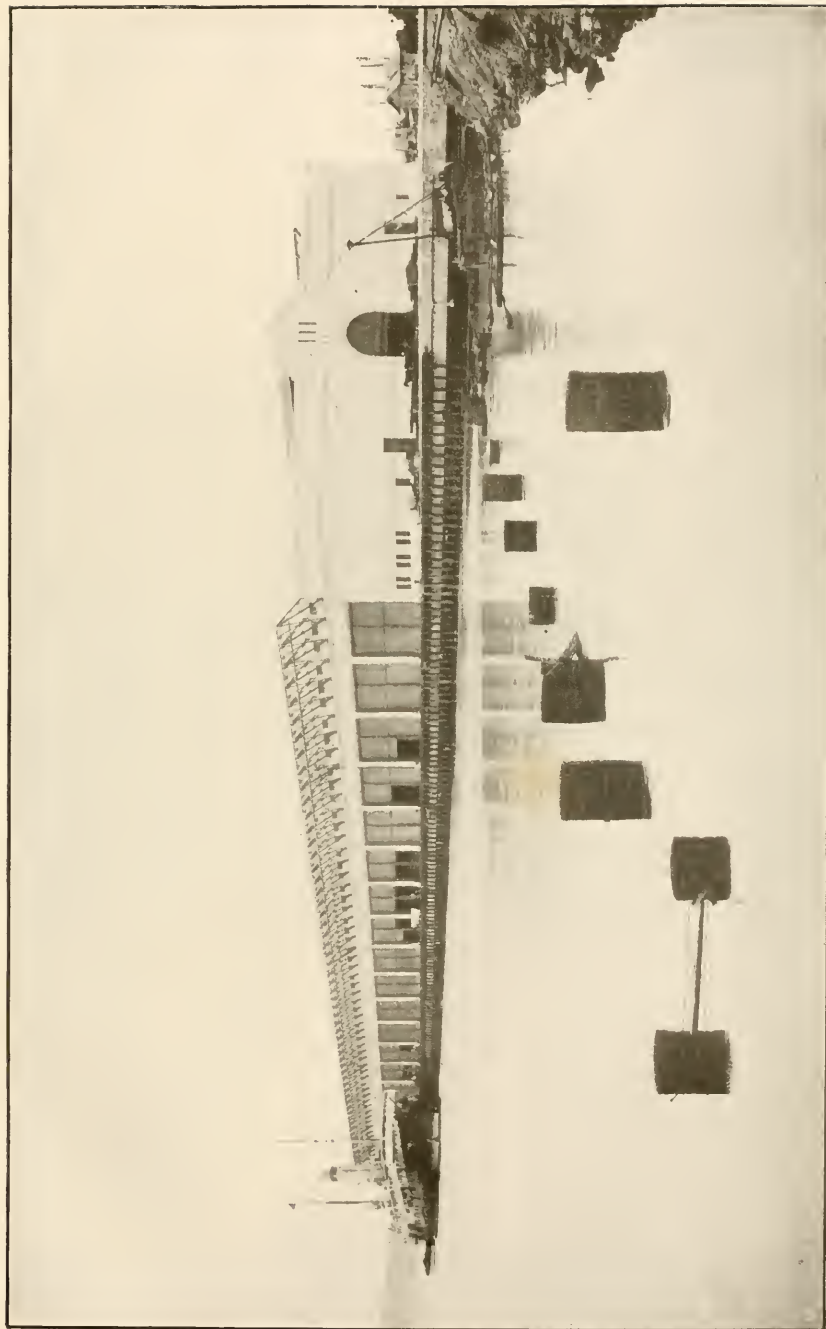
Approved

Jay Moore
 Engineer of Maintenance

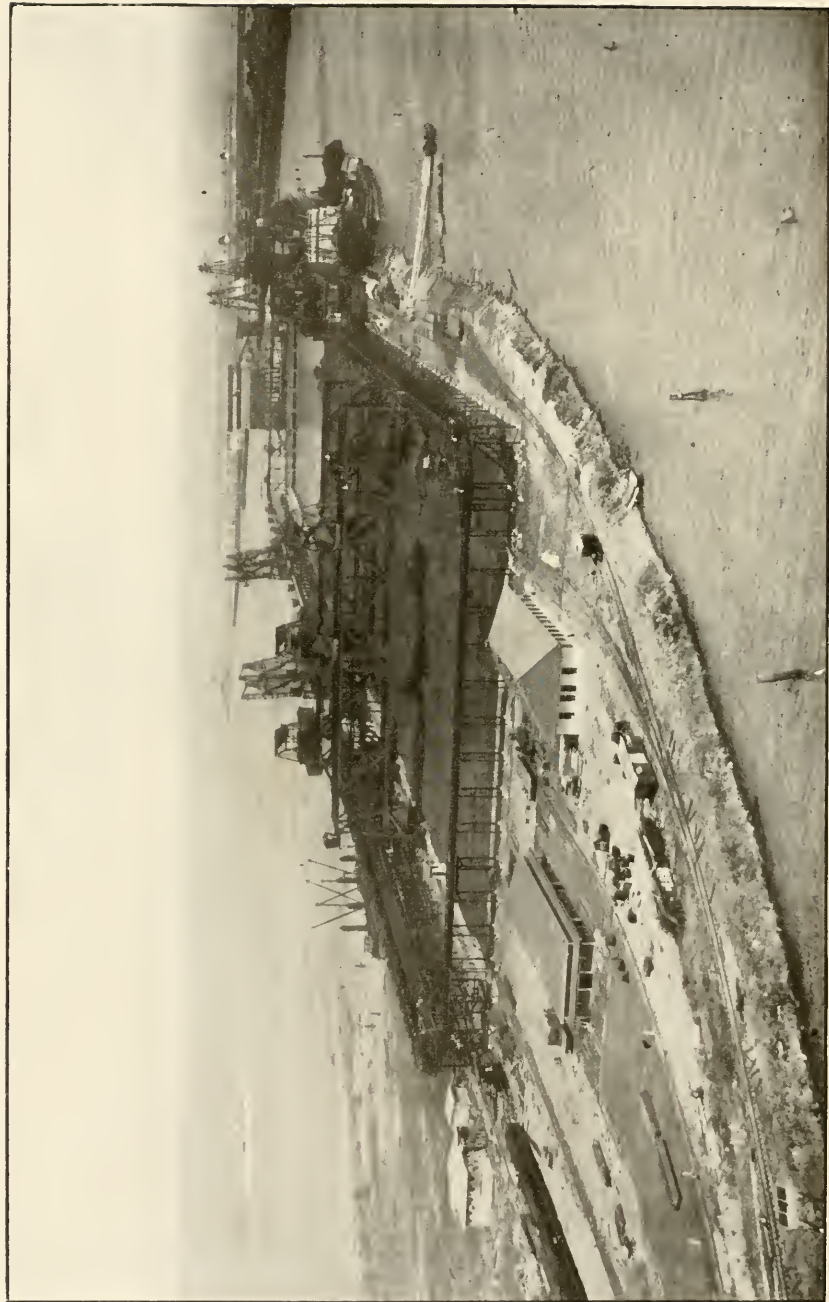




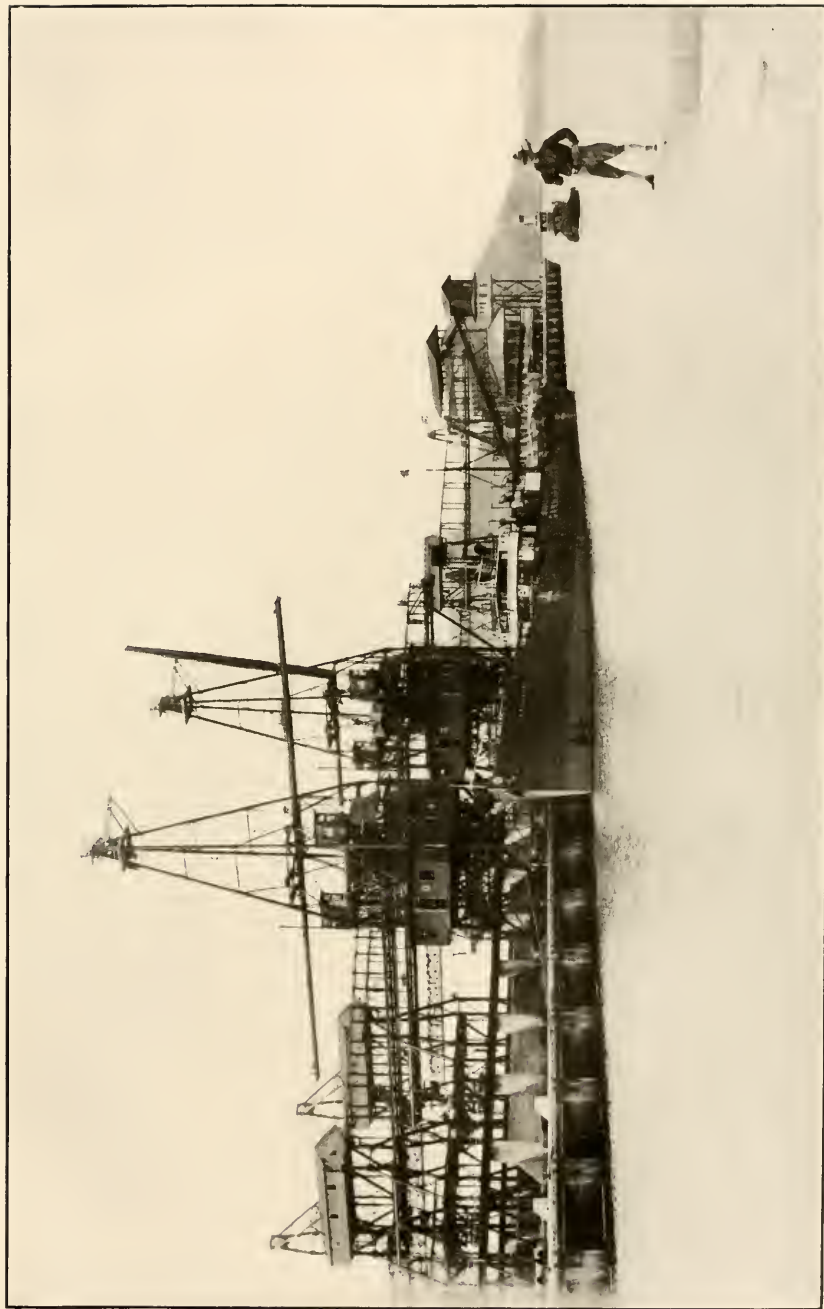
CRISTOBAL TERMINAL PIER NO. 7. PLACING CONCRETE IN SIDE WALLS. JULY 8, 1916.



CRISTOBAL TERMINAL PIER NO. 7. (CYLINDERS IN FOREGROUND, FOUNDATION FOR LAUNCH HOUSE.) FEBRUARY 24, 1917.



CRISTOBAL COALING STATION. MARCH 19, 1917.



BALBOA COALING STATION. UNLOADING S. S. "KRONBERG." MARCH 17, 1917.

APPENDIX B.

REPORT OF THE MARINE SUPERINTENDENT, MARINE DIVISION, DEPARTMENT OF OPERATION AND MAINTENANCE.

BALBOA HEIGHTS, CANAL ZONE, *July 20, 1917.*

SIR: I have the honor to submit the following report of operations in the marine division during the fiscal year ended June 30, 1917:

It became necessary during the year to restrict the amount of bunker coal allowed to vessels using the canal, and, in order to carry out this restriction, the cooperation of steamship agents on the Isthmus was sought, and with few exceptions, obtained.

Our Government's declaration of war against Germany caused little change in the detail of operating the canal. We cooperated with and assisted the military and naval authorities on the Isthmus in every way possible, lending them tugs and motor boats, when available, for patrolling the sea entrances to the canal, and pilots for use in the sea areas, all of which necessarily increased the cost of operating the ports.

The offices of the captain of the port at Balboa were moved into the new reinforced concrete terminal building on July 10, 1916; those of the captain of the port at Cristobal on November 14, 1916.

Cucaracha slide became sufficiently active to interrupt traffic from September 1 to September 6. This was the only movement in the slide area which made necessary the suspension of the passage of ships.

On July 2, while testing the battery of the Punta Mala Lighthouse, one of the fusible plugs on a gas accumulator blew out. This resulted in setting fire to 75 tanks containing approximately 10,000 cubic feet of dissolved acetylene gas. The intense heat generated melted the steel tank house located in the center of the area on which the four legs of the tower rest and completely destroyed the installation. Due to the fact that the wind came from a direction which caused the flames to blow clear of the tower legs, they were not damaged. On July 5 a temporary light was installed. On September 2, the destroyed installation having been replaced and a new tank house installed, the permanent light was again put in service. The Bona Island and Taboguilla Lights gave excellent service at reasonable cost.

The following craft were added to the division's floating equipment: Two pilot boats 40 feet long and having a speed of approximately 18 knots; two 85-foot steel supply boats constructed in the canal shops and propelled by Diesel engines, and one condemned Navy sailing launch transferred from the Navy Department.

ADMEASUREMENT OF VESSELS AND APPLICATION OF TOLLS.

The confusion resulting from the necessity of considering two factors in levying tolls, noted in the last annual report, obtained throughout the year and must continue until the Panama Canal rules for measurement are adopted.

Tolls collected amounted to \$5,631,781.66. Had all tolls been based on the Panama Canal rules alone, the amount collected would have been \$6,668,247.32.

The total number of ships making the transit of the canal during the fiscal year in seagoing traffic was 1,876. The aggregate gross and net tonnages of these ships, according to the rules of measurement for The Panama Canal, were 8,530,821 and 6,009,358 tons, respectively.

The cargo carried through the canal amounted to 7,229,255 tons of 2,240 pounds.

Ships making the passage of the canal without cargo, including naval ships and pleasure craft which did not carry cargo, as well as merchant ships in ballast, aggregated 284. Of these 187 were in transit from the Atlantic to the Pacific, and 97 from the Pacific to the Atlantic; net tonnages were 574,881 and 219,907, respectively.

The average net tonnage of all ships was 3,203 tons. The average net tonnage of the ships carrying cargo was 3,275 tons. The average loading of the ships with cargo was 4,541 tons of 2,240 pounds.

The ratio of tons of cargo to net tonnage of ships with cargo was 1.386. As distributed over the aggregate of traffic for each of the 6,009,358 net tons that passed through the canal there were handled 1.2 tons of cargo.

The following statistics of traffic through the canal are presented:

TABLE NO. 1.—Summary of traffic through The Panama Canal during fiscal year 1917, and since its opening to commercial traffic.

Period.	Atlantic to Pacific.				Pacific to Atlantic.				Total.			
	Vessels.	Canal tonnage.		Cargo tons.	Vessels.	Canal tonnage.		Cargo tons.	Vessels.	Canal tonnage.		Cargo tons.
		Gross.	Net.			Gross.	Net.			Gross.	Net.	
1916.												
July.....	76	369,678	260,521	296,094	73	319,339	228,437	352,863	149	689,017	488,958	648,957
August.....	77	372,042	261,638	246,149	65	295,032	203,340	270,672	142	667,074	464,978	516,821
September.....	69	316,815	219,398	224,661	85	412,175	294,580	437,509	154	728,990	513,978	662,170
October.....	74	317,826	221,610	231,016	84	377,457	272,164	416,877	158	695,283	493,774	647,593
November.....	72	314,179	220,806	198,718	76	303,317	215,398	320,325	148	617,696	436,204	519,043
December.....	82	362,154	261,181	241,987	73	313,065	222,633	305,996	155	675,159	485,814	547,683
Total for first half fiscal year 1917...	450	2,052,694	1,445,154	1,438,625	456	2,020,525	1,436,552	2,103,942	906	4,073,219	2,881,706	3,542,567
1917.												
January.....	77	368,253	258,317	246,139	98	406,554	303,131	425,254	175	774,807	561,448	671,393
February.....	68	324,918	226,247	244,307	72	361,947	251,356	313,462	140	686,865	477,603	557,769
March.....	80	374,578	258,790	315,920	73	306,175	211,359	255,899	153	680,753	470,129	571,819
April.....	82	388,712	278,762	322,656	77	396,396	274,029	305,049	159	795,108	552,791	627,705
May.....	62	259,901	181,289	194,002	106	488,417	340,728	423,101	168	748,318	522,017	617,103
June.....	86	391,677	276,855	315,194	89	380,074	266,809	325,705	175	771,751	543,664	640,899
Total for second half fiscal year 1917.	455	2,118,039	1,480,260	1,638,218	515	2,339,563	1,647,392	2,048,470	970	4,457,602	3,127,652	3,686,088
Total fiscal year 1917.....	905	4,170,733	2,925,414	3,076,843	971	4,360,088	3,083,944	4,152,412	1,876	8,530,821	6,009,358	7,229,255
Fiscal year ending June 30, 1915.....	530	2,657,865	1,884,728	2,125,735	558	2,758,922	1,958,307	2,844,057	1,088	5,416,787	3,843,035	4,969,792
Fiscal year ending June 30, 1916.....	411	1,912,846	1,308,231	1,434,246	376	1,683,683	1,171,531	1,705,810	787	3,596,529	2,479,762	3,140,046
Fiscal year ending June 30, 1917.....	905	4,170,733	2,925,414	3,076,843	971	4,360,088	3,083,944	4,152,412	1,876	8,530,821	6,009,358	7,229,255
Total.....	1,846	8,741,444	6,118,373	6,636,814	1,905	8,802,693	6,213,782	8,702,279	3,751	17,544,137	12,332,155	15,339,093

TABLE No. 2.—*Number of vessels of various nationalities passing through The Panama Canal.*

	Argentinian.	British.	Canadian.	Chilean.	Costa Rican.	Cuban.	Danish.	Dutch.	French.	German.	Honduran.	Italian.	Japanese.	Mexican.	Nicaraguan.	Norwegian.	Panamanian.	Peruvian.	Russian.	Spanish.	Swedish.	United States.	Total.
ATLANTIC TO PACIFIC.																							
1916:																							
July.....		37		4			3	3	1				8			5	1	9			1	10	76
August.....		39		3	1		1	3				1	4			6	5	4			1	13	77
September.....		32		3	1		1	2					9			4		3		2	1	13	69
October.....		31		4	1	1	1	3	1				9			4		4		1		14	74
November.....		32		4	1		1	5					2	1		6		3		1		15	72
December.....		35		4	2	1	3	3					3			6		3		2	1	19	82
1917:																							
January.....		28		4	2		3	5	1				4	2	1	5	1	4		1		16	77
February.....		29		4	1	1	2	1					6			1	1	4			1	17	68
March.....		27		5	1		1	4					4	2		7	3	3				26	80
April.....		31		4	1		2	3		4			5			10	7	4		1		20	82
May.....		14		4	1		2	3	1				2	1		10	1	3	1	1		18	62
June.....		36		4			5	4					3			13	1	2			1	17	86
Total.....		371		50	11	3	26	36	4	4		1	54	6	1	74	5	43	1	10	7	198	905
Total, fiscal year 1916.....		193		16			10	11	2		1	1	19			19	5	16	1		5	114	411
Total, fiscal year 1915.....		226	1	16			10	5			2	1	4			16		2	5		8	231	530
PACIFIC TO ATLANTIC.																							
1916:																							
July.....		38		3				2					3	1		4		3			2	17	73
August.....		32		4				1	2				2			6		4			1	13	65
September.....		47		3	1		3	2					2			4		4	1			24	85
October.....		45		3			2	1				1	1			6		3				14	84
November.....		32		5	2	1	1	3	1				2			5		5		3	1	18	76
December.....		25		4	1		1	3					2	1		9		4			2	13	77

1917:	38	4	2	1	3	5	1	.....	.....	2	.....	.....	8	.....	4	.....	3	1	26	92
January.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
February.....	27	3	1	.....	2	6	.....	.....	.....	2	.....	.....	7	.....	2	.....	1	19	72	.....
March.....	22	4	.....	1	2	1	.....	.....	.....	1	.....	.....	3	.....	4	.....	.....	33	73	.....
April.....	30	4	1	.....	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	77	.....
May.....	36	6	1	.....	4	6	.....	.....	.....	3	.....	.....	7	.....	2	.....	.....	36	106	.....
June.....	34	4	1	.....	3	2	.....	.....	.....	.....	.....	.....	10	.....	3	.....	2	28	89	.....
Total.....	409	49	12	3	17	38	5	2	.....	1	18	7	76	.....	2	43	1	10	246	971
Total, fiscal year 1916.....	1	17	.....	.....	8	4	1	.....	.....	2	.....	.....	26	.....	2	14	.....	8	124	376
Total, fiscal year 1915.....	239	19	.....	.....	13	2	1	.....	.....	1	5	.....	26	.....	2	2	1	10	239	558
AGGREGATES BY FISCAL YEARS.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1917.....	780	99	23	6	43	74	9	6	.....	2	72	13	150	.....	7	86	2	20	464	1,876
1916.....	1	33	.....	.....	18	15	1	.....	.....	3	1	24	45	.....	6	30	1	13	238	787
1915.....	465	35	23	7	3	3	2	6	42	2	4	6	18	470	1,988
Grand total.....	1,1,603	1	167	6	84	96	13	6	6	5	102	13	237	15	120	9	20	1,172	3,751

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STEAMBOAT-INSPECTION SERVICE.

All accidents resulting in serious damage to shipping in Canal Zone waters were investigated by the board of local inspectors, which, in every case possible, fixed the responsibility and estimated the cost of repairs.

Further details of the operations of the board of local inspectors are contained in the following extracts from its annual report:

There was no change in personnel.

Two semiannual inspections of the floating plant of the canal and railroad were made, the reports thereof approved, and the heads of divisions interested notified to make their floating equipment conform thereto.

Inspections were made of and certificates of seaworthiness issued to 3 American steamers, 20 foreign steamers, 48 motor boats of The Panama Canal, 2 motor boats of the Panama Railroad Co., and 72 privately owned motor boats. Inspections were also made of the boilers, hulls, and equipment of the steamers *General G. W. Goethals*, *General H. F. Hodges*, *General W. C. Gorgas*, and *General O. H. Ernst*.

Inspections and hydrostatic tests were made of 98 boilers on floating equipment of The Panama Canal and Panama Railroad Co. and the heads of divisions interested were furnished reports and certificates thereof.

On request of the surveying officer, from time to time the board made appraisals of floating plant for sale or transfer and recommended disposition of miscellaneous equipment on survey requests. On request of the auditor, it also appraised 19 barges, the property of the canal and railroad, in order that he might write off on his books amounts covering their depreciation.

The scheme of issuing card licenses bearing description, signatures, photograph, and seal to chauffeurs and operators of motor boats, recommended during the previous fiscal year and referred to in the last annual report, was approved and put into effect. Of the former 1,499 and of the latter 386 were issued.

On February 1, 1917, the Acting Governor addressed a letter to the commanding general, United States troops, sustaining the decision of the auditor that a fee or \$1 should be collected from every successful applicant for chauffeur's or navigator's license, and since that date this practice has been observed.

The board noted your letter of May 5, 1917, to the commanding officer, Panama Canal and Canal Zone, advising that, so far as The Panama Canal is concerned, there will be no interference with the free use of Canal Zone streets and roads by Army vehicles plainly marked as such, no matter whether or not the operators of such vehicles have been licensed as chauffeurs by the board of local inspectors.

Licenses were issued to 12 pilots, 9 masters, 26 mates, 16 engineers, 437 operators of motor boats, and 1,726 chauffeurs.

Licenses were refused 3 mates, 6 engineers, 50 operators of motor boats, and 406 chauffeurs.

The licenses of 2 operators of motor boats and 9 chauffeurs were revoked.

Upon the presentation of evidence in each case that the licensee was qualified to hold the higher grade of license, the grade of 7 licenses of operators of motor boats was raised.

Respectfully,

H. I. CONE,
Marine Superintendent.

Col. CHESTER HARDING, *United States Army,*
Governor, The Panama Canal, Balboa Heights, Canal Zone.

APPENDIX C.

REPORT OF THE RESIDENT ENGINEER, DREDGING DIVISION, DEPARTMENT OF OPERATION AND MAINTENANCE.

PARAISO, CANAL ZONE.

SIR:—I have the honor to submit the following report of operations in the dredging division during the fiscal year ended June 30, 1917:

DIVISION ORGANIZATION.

The division is divided into two districts, the first embracing all dredging operations in the Pacific entrance, Miraflores Lake, and Gaillard Cut; the second district, all dredging operations in the Atlantic entrance and Gatun Lake.

DREDGING.

The following dredges were in operation during the year:

The seagoing suction dredge *Culebra* was engaged in deepening the channel through Gaillard Cut, maintaining the Atlantic and Pacific entrance channels, Balboa Harbor, and excavating and transporting sand from Chame Point to the Balboa dry dock.

The 18-inch pipe line dredge *No. 4* was engaged in excavating berthing slips at the Cristobal coaling station, Piers Nos. 6, 7, and 8. Cristobal, and maintaining the channel to the dry dock and coal plant at Mount Hope, from July 1, 1916 to December 8, 1916, on which date it was permanently retired from service.

The 20-inch pipe line dredge *No. 82* was engaged during the entire year, excavating sand and gravel from the Chagres River gravel beds above Gamboa.

The 20-inch pipe line dredge *No. 83* was engaged in cleaning up the channel through Miraflores Lake and in making sanitary fills in the vicinity of Paraiso and Pedro Miguel.

The 20-inch pipe line dredge *No. 84* was engaged in excavating *Culebra* slide in Gaillard Cut, and maintaining the channel at the Atlantic entrance, excavating at Pier No. 6 and the dry dock slip at Cristobal, and making sanitary fills in the vicinity of Mount Hope.

The 20-inch pipe line dredge *No. 85*, which had been retired in May, 1916, was returned to service July 21, 1916, and was engaged during the remainder of the year in maintaining the Pacific entrance channel, excavating for the oil dock and in Balboa Harbor.

The 20-inch pipe line dredge *No. 86* was engaged during the year excavating Cucaracha and *Culebra* slides and maintaining the channel through Gaillard Cut, making sanitary fills at Paraiso, and excavating around the steamship *Ilford*, aground in Gatun Lake.

The 15-yard dipper dredge *Cascadas* was operated in Gaillard Cut, excavating at Cucaracha and Culebra slides, deepening the channel along the reloader wharf, and removing the cofferdam at Balboa dry dock, and removing rock shoals from the Pacific entrance.

The 15-yard dipper dredge *Gamboa* was operated in Gaillard Cut, excavating at Cucaracha, Culebra and various smaller slides, and at Cristobal removing rock shoals from the approach channel at coaling station.

The 15-yard dipper dredge *Paraiso* was operated the entire year in Gaillard Cut, widening and deepening the channel at Cucaracha and Culebra slides.

The 5-yard dipper dredge *Cardenas*, retired in January, 1916, was placed in commission on July 22, 1916, and operated 9 days in July, 7 days in August, and 7 days in September in Gaillard Cut, widening and deepening the channel at Culebra slide. It was permanently retired from service on September 23, 1916.

The seagoing ladder dredge *Corozal* was engaged in excavating Cucaracha and Culebra slides in Gaillard Cut, maintaining the channel and removing the Cocoli Hill slide in the Pacific entrance, excavating the cofferdam at Balboa dry dock and deepening the channel along the reloader and Panama Railroad steel wharves at Balboa.

The French ladder dredge *No. 1* was engaged in deepening and maintaining the channel at Culebra slide in Gaillard Cut and in the Pacific entrance, and excavating along the reloader wharf and dry dock entrance in Balboa Harbor from July 1, 1916, to October 29, 1916, and permanently retired on October 30, 1916.

The French ladder dredge *No. 5* was engaged in removing the dry-dock cofferdam at Balboa from July 1, 1916, to October 29, 1916, and was permanently retired from service on October 30, 1916.

The French ladder dredge *Marmot* was engaged in deepening the east and west channels at the Cristobal coaling station, rehandling material in Gaillard Cut, excavating at Lirio, Cucaracha, and Pedro Miguel slides, maintaining the channel at the Pacific entrance and Cocoli Hill slides, and dredging along the reloader and unloader wharves and Piers Nos. 14, 15, 16, and 18 in Balboa Inner Harbor.

The drill barge *Teredo No. 2* was operated during the year at Culebra and Cucaracha slides, at the dry-dock cofferdam, Balboa Inner Harbor, and the Pacific entrance.

The rock breaker *Vulcan* was engaged during the year breaking rock in the vicinity of the Gamboa Dike and between stations 1445-1460, Gatun Lake, in the Pacific entrance, and Balboa Harbor. It was retired from service October 12, 1916.

The hydraulic grader *No. 1* was engaged during the year ditching and grading the east and west Culebra slides, sluicing at the north side of Gold Hill, Cucaracha, Powderhouse, and Cocoli Hill slides, the Rio Grande spillway, unloader and reloader wharves at Balboa, and in excavating a channel into dry dock No. 2 at Balboa.

The hydraulic graders *No. 2* and *No. 3* were engaged in sluicing and grading operations at Culebra slide during the entire year.

The floating compressor plant was operated from July 1, 1916, to May, 1917, supplying air to the drills at work on the slides.

The tug *U. S. Reliance* sank on the morning of December 27, 1916, about 500 feet off the outer end of the west breakwater at Cristobal. All efforts to raise the tug failed, on account of the heavy seas during the dry season; but the work was resumed in June, 1917, when the seas became quieter.

The following table shows the output of all dredges during the year, with total and unit costs of same:

TABLE No. 1.—Output of all dredges, with total and unit costs.

Dredge.	Output in cubic yards.			Cost.	Unit cost.
	Earth.	Rock.	Total.		
Culebra.....	1,584,108		1,584,108	\$228,101.11	\$0.1440
No. 4.....	577,636	9,164	586,800	71,779.35	.1223
No. 82.....	268,897		268,897	115,498.17	.4295
No. 83.....	782,823	2,000	784,823	136,275.42	.1736
No. 84.....	955,385	35,164	990,549	175,431.15	.1771
No. 85.....	1,409,936		1,409,936	172,438.00	.1223
No. 86.....	965,399		965,399	226,955.29	.2351
Cascadas.....	94,225	2,120,104	2,214,329	845,875.45	.3820
Gamboa.....	46,220	2,096,521	2,142,741	698,714.16	.3261
Paraiso.....		2,538,530	2,538,530	792,305.53	.3121
Cardenas.....		61,880	61,880	21,226.79	.3430
Corozal.....	251,650	975,891	1,227,541	543,183.91	.4425
No. 1.....	100,348	26,260	126,608	39,121.70	.3090
No. 5.....	77,498	44,413	121,911	43,636.84	.3579
Marmot.....	201,362	220,471	421,833	180,581.15	.4281
Total.....	7,315,487	8,130,398	15,445,885	4,291,124.02	.27782
Total, 1916.....	3,984,897	11,718,632	15,703,529	4,363,443.38	.27786

While the above table shows the actual cost of the yardage removed, the cost of the total yardage handled by dredges would be considerably less, as there were 648,519 cubic yards rehandled for which no credit was taken upon second handling. The following table shows the total and unit costs of all yardage actually handled by dredges during the year:

TABLE No. 2.—All yardage actually handled, with total and unit costs.

Dredge.	Output in cubic yards.			Cost.	Unit cost.
	Primary.	Rehandled.	Total.		
No. 83.....	784,823	23,877	808,700	\$136,275.42	\$0.1685
No. 85.....	1,409,936	22,200	1,432,136	172,438.00	.1204
No. 86.....	965,399	492,187	1,457,586	226,955.29	.1557
Marmot.....	421,833	110,255	532,088	180,581.15	.3394
Total.....	3,581,991	648,519	4,230,510	716,249.86	.16931
Other dredges.....	11,863,894		11,863,894	3,574,874.16	.30132
Total.....	15,445,885	648,519	16,094,404	4,291,124.02	.26662

With the exception of dredges Nos. 82 and 85, costs are for material placed on the dump. Costs on dredge No. 82 are for material alongside the dock and on No. 85 for material delivered to the first relay.

The following tables show the monthly output of all dredges exclusive of the sand and gravel plants:

TABLE No. 3.—Yardage removed, first district, Pedro Miguel lock to the sea.

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1916.							
July.....	296,782	1,200	297,982	41,171	24,985	66,156	364,138
August.....	298,363	.....	298,363	199,785	68,134	267,919	566,282
September.....	69,995	.....	69,995	225,714	8,170	233,884	303,879
October.....	79,730	.....	79,730	128,166	8,827	136,993	216,723
November.....	167,452	35,152	202,604	151,227	20,000	171,227	373,831
December.....	331,763	56,675	388,438	98,110	.....	98,110	486,548
1917.							
January.....	179,696	2,000	181,696	159,608	.....	159,608	341,304
February.....	69,010	32,164	101,174	142,633	.....	142,633	243,807
March.....	76,792	25,750	102,542	126,598	5,825	132,423	234,965
April.....	57,648	10,000	67,648	216,885	22,190	239,075	306,723
May.....	58,673	7,790	66,463	270,620	17,000	287,620	354,083
June.....	24,969	13,343	38,312	209,526	63,302	272,828	311,140
Total.....	1,710,873	184,074	1,894,947	1,970,043	238,433	2,208,476	4,103,423

TABLE No. 4.—Yardage removed, first district, Gaillard Cut, Pedro Miguel lock to Gamboa Dike.

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1916.							
July.....	39,645	1,034,030	1,073,675	.....	.....	.....	1,073,675
August.....	70,098	754,144	824,242	27,422	.....	27,422	851,664
September.....	66,235	729,749	795,984	.....	.....	.....	795,984
October.....	118,127	748,841	866,968	.....	.....	.....	866,968
November.....	128,610	692,273	820,883	.....	.....	.....	820,883
December.....	149,470	441,178	590,648	.....	.....	.....	590,648
1917.							
January.....	152,038	691,349	843,387	.....	.....	.....	843,387
February.....	181,077	578,513	759,590	.....	.....	.....	759,590
March.....	121,340	651,270	772,610	.....	.....	.....	772,610
April.....	159,632	471,305	630,937	.....	.....	.....	630,937
May.....	184,102	428,460	612,562	.....	.....	.....	612,562
June.....	352,389	285,864	638,253	.....	.....	.....	638,253
Total.....	1,722,763	7,506,976	9,229,739	27,422	.....	27,422	9,257,161

TABLE No. 5.—Yardage removed, second district.

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1916.							
July.....	.....	.....	.....	130,472	46,203	176,675	176,675
August.....	.....	.....	.....	279,872	40,475	320,347	320,347
September.....	.....	.....	.....	235,253	15,452	250,705	250,705
October.....	135,756	.....	135,756	135,413	.....	135,413	271,169
November.....	.....	.....	.....	158,398	.....	158,398	158,398
December.....	.....	.....	.....	122,604	36,214	158,818	158,818
1917.							
January.....	.....	.....	.....	46,272	52,812	99,084	99,084
February.....	.....	.....	.....	19,506	9,759	29,265	29,265
March.....	.....	.....	.....	65,009	.....	65,009	65,009
April.....	.....	.....	.....	156,704	.....	156,704	156,704
May.....	.....	.....	.....	78,882	.....	78,882	78,882
June.....	48,148	.....	48,148	3,200	.....	3,200	51,348
Total.....	183,904	.....	183,904	1,431,585	200,915	1,632,500	1,816,404

On July 1, 1917, there remained to be removed from the canal prism, including siltage, slides, and original material, 5,939,640 cubic yards of earth and 4,521,200 cubic yards of rock. These quantities include 350,000 cubic yards of earth at the Pacific and 200,000 cubic yards of earth at the Atlantic entrances, estimated to cover siltage of the channel from July 1, 1917, to June 30, 1918.

TABLE NO. 6.—*Yardage remaining to be removed from the canal prism.*

Location.	Earth.	Rock.	Total.
<i>First district.</i>			
Pacific entrance, construction.....	471,000	204,000	675,000
Pacific entrance, maintenance.....	1,726,700		1,726,700
Miraflores Lake, maintenance.....	100,000		100,000
Gaillard Cut, construction.....		316,000	316,000
Gaillard Cut, maintenance.....	1,850,000	4,000,000	5,850,000
<i>Second district.</i>			
Gatun Lake, construction.....	51,000		51,000
Gatun Lake, maintenance.....	250,000		250,000
Atlantic entrance, construction.....	365,940	1,200	367,140
Atlantic entrance, maintenance.....	1,125,000		1,125,000
Total.....	5,939,640	4,521,200	10,460,840

The following table shows the number of days the dredges were retired for repairs and renewals:

TABLE NO. 7.—*Number of days dredges were retired for repairs and renewals.*

Dredge.	Type.	Days out of service.	Remarks.
Culebra.....	Seagoing suction.....	50	Retired Dec. 8, 1916. Chagres River gravel service; repairs made in field while waiting for barges.
No. 4.....	Pipe line suction.....	216	
No. 82.....	do.....	7	
No. 83.....	do.....	6	
No. 84.....	do.....	20	
No. 85.....	do.....	45	Retired Oct. 30, 1916. Do.
No. 86.....	do.....	18	
Corozal.....	Seagoing ladder.....	35	
No. 1.....	French ladder.....	281	
No. 5.....	do.....	282	
Marmot.....	do.....	8	
Cascadas.....	15-yard dipper.....	12	
Gamboa.....	do.....	21	
Paraiso.....	do.....	32	
Cardenas.....	5-yard dipper.....	342	

SUBAQUEOUS ROCK EXCAVATION.

FIRST DISTRICT, GAMBOA DIKE TO PANAMA BAY.

During the year 7,929,483 cubic yards of hard and soft rock were removed from the canal prism and Balboa Harbor as follows: 182,074 cubic yards from the Pacific entrance; 2,000 cubic yards from Miraflores Lake; 6,298,533 cubic yards from Culébra slide; 967,303 cubic yards from Cucaracha slide; 241,140 cubic yards from small slides and maintenance in Gaillard Cut; 235,951 cubic yards from Balboa Harbor; and 2,482 cubic yards from in front of the Panama railroad

steel wharf. Of this amount 82,387 cubic yards were drilled and blasted by the *Teredo No. 2*; 3,077 cubic yards were broken by the rock breaker *Vulcan*; 212,843 cubic yards, too large for the dredges to handle, by hand and tripod drills at Cucaracha and Culebra slides in Gaillard Cut, and 6,454 cubic yards by well drills. On this work 297,208 pounds of dynamite were used.

The following table shows the location, quantity, method of breaking and area covered, of all rock shoals worked, exclusive of the hand and tripod drill work at Cucaracha and Culebra slides, and a monthly statement of rock removed by dredges:

TABLE NO. 8.—*Rock removed by dredges.*

Month. and year.	Station and method of breaking.		Area covered (square yards.)	Cubic yards mined.	Amount dredged.
	Teredo No. 2.	Vulcan.			
1916.					
July.....	Balboa Harbor, 2102-60-2106-00E.	2250-2260 W.....	140,421	9,007	1,060,215
August.....	Balboa Harbor.....	Balboa Harbor, Gamboa Dike.	74,875	8,595	822,278
September ¹	Cucaracha and Culebra slides.	1445-1450—Gamboa.....	40,576	7,457	737,919
October.....	do.....	.....	8,960	4,844	757,668
November.....	do.....	.....	21,120	9,402	747,425
December.....	do.....	.....	17,344	8,634	497,853
1917.					
January.....	Culebra slide and Balboa Harbor.	.....	8,364	5,123	693,349
February.....	do.....	.....	8,379	5,820	610,677
March.....	Culebra slide.....	.....	11,760	7,439	682,845
April.....	Culebra and Cucaracha slide.	.....	11,270	7,599	503,495
May.....	Culebra slide and Balboa Harbor.	.....	9,892	5,192	453,250
June.....	Balboa Harbor.....	.....	16,632	6,352	362,509
Total.....	.....	.....	369,593	85,464	7,929,483

¹ *Vulcan* retired from Canal service Sept. 9, 1916.

SECOND DISTRICT.

No rock was mined or removed from the canal prism. Dredges removed 166,187 cubic yards of coral and rock from the coaling-station areas and vicinity which had been drilled and blasted in previous years.

DREDGING OPERATIONS.

FIRST DISTRICT.

Dredges were at work throughout the year deepening and maintaining the canal channel at the Pacific entrance, Miraflores Lake, and Gaillard Cut, excavating a total of 11,124,686 cubic yards, as shown in the following table:

TABLE No. 9.

Section.	Excavation, in cubic yards.		
	Construction.	Maintenance.	Total.
Pacific entrance	221, 138	978, 426	1, 199, 564
Miraflores Lake	246, 998	448, 385	695, 383
Gaillard Cut	1, 080, 105	8, 149, 634	9, 229, 739
Total, canal prism (first district)	1, 548, 231	9, 576, 445	11, 124, 686

Of the material removed from Gaillard Cut 74.1 per cent was from Culebra slide, 11.5 per cent from Cucaracha slide, and 14.4 per cent from all other slides and canal areas.

The following table shows the distribution of all material removed from Gaillard Cut during the year:

TABLE No. 10.—*Distribution of material removed from Gaillard Cut.*

Location.	Fiscal year.			Total to date.		
	Earth.	Rock.	Total.	Earth.	Rock.	Total.
Gamboa Dike				23, 856	53, 105	76, 961
Las Cascadas slide		16, 370	16, 370		16, 370	16, 370
Whitehouse slide, east	7, 188	7, 187	14, 375	7, 188	11, 232	18, 420
Powderhouse slide, east	30, 908	30, 907	61, 815	30, 908	30, 907	61, 815
La Pita slide		27, 720	27, 720		52, 453	52, 453
Empire slide	8, 124	2, 031	10, 155	11, 345	117, 547	128, 892
Lirio slide	990	36, 680	37, 670	990	36, 680	37, 670
Culebra slide, new ¹	517, 499	6, 316, 573	6, 834, 072	1, 533, 597	20, 636, 526	22, 170, 123
Culebra slide, old ²				28, 449	1, 061, 337	1, 089, 786
Cucaracha slide	98, 564	967, 303	1, 065, 867	1, 422, 777	4, 259, 466	5, 682, 243
Pedro Miguel slide	1, 956	7, 254	9, 210	1, 956	7, 254	9, 210
65-foot berm					25, 730	25, 730
Miscellaneous ³	1, 057, 534	94, 951	1, 152, 485	2, 506, 911	151, 760	2, 658, 671
Total	1, 722, 763	7, 506, 976	9, 229, 739	5, 567, 977	26, 460, 367	32, 028, 344

¹ Since Oct. 14, 1914.² Prior to Oct. 14, 1914.³ Small slides and fills in the canal.

Cucaracha slide, which had been quiescent during the past year, showed signs of new life early in August, 1916, when a large mass of rock broke loose from the southeast corner of Gold Hill and started moving toward the canal. The point of break was 900 feet from the canal and at elevation 475 feet, or 390 feet above the bed of the canal. On August 24 this movement became greatly accelerated, and on August 30 the slide had so blocked the channel that all traffic through the canal was suspended until September 7, a period of eight days. The slide has been fairly quiescent throughout the remainder of the year.

Culebra slide has been active throughout the year, but with the exception of two days, January 10 and 11, 1917, a channel has been maintained. New breaks have occurred in the east bank, but the west slide has not materially increased in area during the year. The area of east Culebra slide on June 30, 1917, was 91 acres, an increase of 3 acres during the year. The total area of both east and west Culebra slides as of June 30, 1917, was 164 acres. There have been removed from the Culebra slides by dredges 23,259,909 cubic yards of mate-

rial, and it is estimated that 3,600,000 cubic yards in motion toward the canal will have to be removed.

The smaller slides have been mostly inactive during the year, and at no time have they seriously affected the channel.

A new break occurred in Cocoli Hill on the west bank of the canal and near the sea end of Miraflores locks. The material in motion was removed by dredges, after which the hydraulic grader started sluicing down the face of the hill, starting at the surface of the ground some distance back of the farthest break and cutting to a regular grade down to the water's edge. Since grading was completed, no further trouble has been experienced.

The passage of commercial shipping through the canal was suspended on account of slides from August 30 to September 6, 1916, and January 10-11, 1917, a total of 10 days during the year.

Daily surveys were made in the vicinity of the active slides and the channel dragged and marked with buoys for the passage of ships from July 1, 1916, to May 15, 1917, after which date surveys were made twice a week and channel buoying discontinued except in emergency cases.

Dumps.—The spoil from Gaillard Cut was disposed of on dumps located in Gatun Lake from Tabernilla, mile 23, to Gamboa, mile 30; in the Rio Grande Valley south of Cucaracha; Miraflores Lake; at Paraiso, Pedro Miguel, and in the canal near Paraiso; 7,924,921 cubic yards were dumped in Gatun Lake; 666,279 cubic yards in Rio Grande Valley; 797,545 cubic yards in the swamps around Paraiso; 38,232 cubic yards in the swamp near Pedro Miguel corral; 41,425 cubic yards in Miraflores Lake; and 387,656 cubic yards in the canal near Paraiso. Part of the material dumped in the canal was from the dredges working south of the slide when the channel was closed, and the remainder was dumped for rehandling into the sanitary fills near Paraiso and Pedro Miguel. All material dumped in the canal has been rehandled and placed in sanitary fills in the near vicinity.

SECOND DISTRICT.

Dredges removed 183,904 cubic yards of earth from the canal prism, all of which was maintenance excavation.

No dredging was done in the Gatun Lake section, Gatun locks to Gamboa Bridge.

Material excavated in the second district was dumped outside the breakwater and west of the canal at Mindi.

MISCELLANEOUS DREDGING.

PACIFIC TERMINALS.

There were 1,603,006 cubic yards of earth and 15,000 cubic yards of rock removed from the Balboa Inner Harbor by pipe-line, ladder, and dipper dredges; 13,910 cubic yards of earth from along Pier No. 13; 40,655 cubic yards of earth and 17,990 cubic yards of rock from along Pier No. 14; 7,750 cubic yards of earth and 1,850 cubic yards of rock from along Pier No. 15; 61,300 cubic yards of earth and 17,430

cubic yards of rock from along Pier No. 18; 142,209 cubic yards of earth and 24,760 cubic yards of rock from along the reloader wharf; 3,412 cubic yards of earth and 2,482 cubic yards of rock from along the Panama Railroad steel wharf; 7,785 cubic yards of earth from the berths at the oil dock, and 87,816 cubic yards of earth and 158,921 cubic yards of rock from the cofferdam and entrance to the dry dock. Also the dredge *Culebra* excavated 2,200 cubic yards of sand at Chame Point and dumped same in the Balboa Dry Dock for the use of the mechanical division. Dredge *No. 85* rehandled 22,200 cubic yards of earth from the dredge *Corozal*.

Hydraulic grader *No. 1* sluiced the soft material from under the concrete wharves at the Balboa coaling station and cut a channel for small craft through the cofferdam at the entrance to Dry Dock No. 2.

Material removed by pipe-line dredges was used in reclaiming swamp lands along the Corozal-Panama road and that removed by ladder and dipper dredges was towed to sea and dumped, except 22,200 cubic yards which were dumped in the Inner Harbor and rehandled by pipe-line dredge.

ATLANTIC TERMINALS.

There were 759,686 cubic yards of earth and 200,915 cubic yards of rock removed from the Atlantic terminals, as follows: Five thousand two hundred and ninety-nine cubic yards of earth and 25,564 cubic yards of rock from the approach channel; 1,014 cubic yards earth and 2,364 cubic yards of rock from the old coal dock; 3,710 cubic yards of earth from dry-dock slip; 11,713 cubic yards of earth from the oil and pipe-line trench crossing to the Cristobal coaling station; 319,737 cubic yards earth and 6,800 cubic yards rock from the berths at Piers Nos. 6, 7, and 8; 372,257 cubic yards earth and 200 cubic yards rock from Cristobal Harbor; 12,511 cubic yards earth and 165,987 cubic yards of rock from the Cristobal coaling station; and 33,445 cubic yards of earth from the channel to the old coal dock. In addition, 170,243 cubic yards of coral sand was excavated in Folks River and placed in sanitary fills east of the Mount Hope road, and 501,656 cubic yards from the French canal and borrow pits along its west bank and placed 498,456 cubic yards in sanitary fill south of the dry dock and 3,200 cubic yards at the old coal station.

Material excavated was disposed of as follows: 330,436 cubic yards on the Cristobal mole; 288,448 cubic yards on fills near the substation; 13,645 cubic yards in oil and water pipe line trench; 9,431 cubic yards fill near the yard office; 3,200 cubic yards at old coal dock; 106,595 cubic yards on Telfer Island; 170,243 cubic yards in sanitary fills east of the Mount Hope road; 536,303 cubic yards in sanitary fill south of dry dock, and 174,199 cubic yards dumped on the toes of the east and west breakers.

SAND AND GRAVEL PRODUCTION.

The sand and gravel necessary for construction purposes was excavated by pipe-line dredge *No. 82* from the gravel beds in the overflow district of the Chagres River above Gamboa. There were

93,440 cubic yards of sand, 30,582 cubic yards of No. 1 gravel, 101,506 cubic yards of No. 2 gravel, and 43,369 cubic yards of run of bank gravel excavated and delivered to the Gamboa gravel plant for distribution to the various divisions.

DIVERSIONS AND DRAINAGE.

The diversion ditches diverting the water of the Obispo diversion into the canal were cleaned of grass and small earth slides.

Ditches were maintained at east and west Culebra slides, at Cucaracha, and all other slides by the hydraulic graders to provide a quick run-off for the storm and surface water and to prevent the formation of ponds in the low areas and depressions.

SLIDE INSPECTION AND REPORTS.

Inspections of all active slides were made from time to time, new breaks located and reported.

Weekly readings were taken in the pipes established at the request of the slide commission of December, 1915, and January, 1916, for determining the elevation of the ground water.

MINDI DIKES AND GROINS.

The three rock dikes built on the south shore of Limon Bay, just west of the canal, have proved entirely successful and required no maintenance during the year. These dikes have entirely stopped the erosion or scouring of the beach at this point where, for the period 1905-1914, the erosion had been at the average rate of over 88 feet a year.

The wooden groins built in 1915 at approximately 400 feet intervals from the rock dikes to Kinneys Bluff have been repaired and maintained throughout the year. The beach from groins Nos. 4 to 10 continued to scour somewhat, which showed that the groin interval was too great. Groins $4\frac{1}{2}$, $5\frac{1}{2}$, $6\frac{1}{2}$, $7\frac{1}{2}$, $8\frac{1}{2}$, and $9\frac{1}{2}$ were built midway between groins 4, 5, 6, 7, 8, 9 and 10. The scouring of the beach has practically ceased since these groins were completed. From groin No. 10 to groin No. 30 near Kinneys Bluff there has been practically no change in the contour of the beach. These temporary groins have been so successful in arresting the eroding action of the sea that it is recommended that the groins be replaced with ones of more permanent construction. It is not thought necessary to replace the temporary groins Nos. 18 to 30 at the present time.

WATER HYACINTHS.

The destruction of the water hyacinths in the waters of the canal, Gatun Lake, and its tributaries was continued throughout the year, the same outfit and methods being employed as in previous years. There were 247,557 square yards of hyacinths killed by arsenic spraying and 385,700 young plants were pulled and deposited on shore. The only old plants found during the year were in the upper reaches of the Pescado River, where a camp was established and

active measures taken to exterminate them. Considerable spraying was done in the overflow section of the Obispo and Mandingo Rivers, where the water lettuce had grown so as to hide the young hyacinths, making it necessary to spray the entire mass. Inspection of the waters of Gatun Lake, including the Chagres, Trinidad, Gatun, Siri, Chilibre, Cano, Gatuncillo, Giganto, Pescado, Mandingo, Obispo and Rio Grande Rivers were made. No hyacinths were found in the lake north of Bohio, although the upper Trinidad, Siri, and Gatun Rivers valleys are so choked with drift and floating islands that a complete inspection was impossible.

SURVEYS.

The usual surveys were made of the dredged areas in the canal prism, Cristobal Harbor, Limon Bay, Gaillard Cut, Miraflores Lake, and Balboa Harbor.

A general hydrographic chart of the channel and lake for one-half mile on either side was made from Gatun to Gamboa.

Topographic surveys were made of Culebra and Cucaracha slides and maps prepared. When necessary special surveys were made to determine the movements of the active slides.

The points established last year at the request of the chairman of the slide commission, on Gold, Zion, Contractors, and Purple Hills, also at the base of Gold and Contractors Hills, were checked from time to time to determine any movement or indication of sliding.

Test borings started in May, 1917, at the site of the proposed dry dock at Cristobal were 40 per cent completed. Borings are being made with wash drills and cores are taken with the diamond at given intervals through the rock.

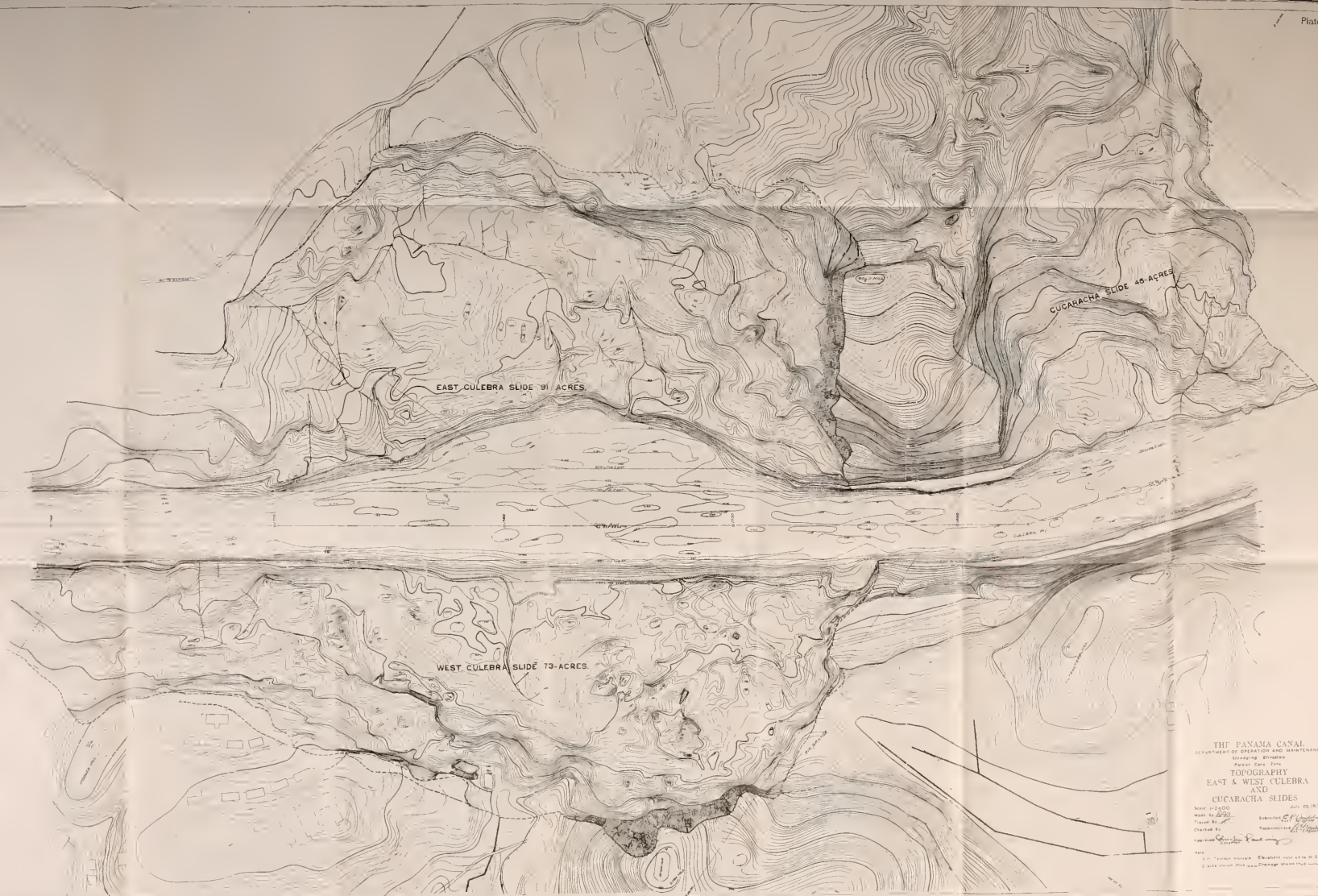
OFFICE.

Routine clerical work, preparation of progress records, estimates, requisitions, etc., were satisfactorily performed during the year.

Respectfully submitted,

W. G. COMBER,
Resident Engineer.

Col. CHESTER HARDING, United States Army.
Governor, The Panama Canal, Balboa Heights, Canal Zone.

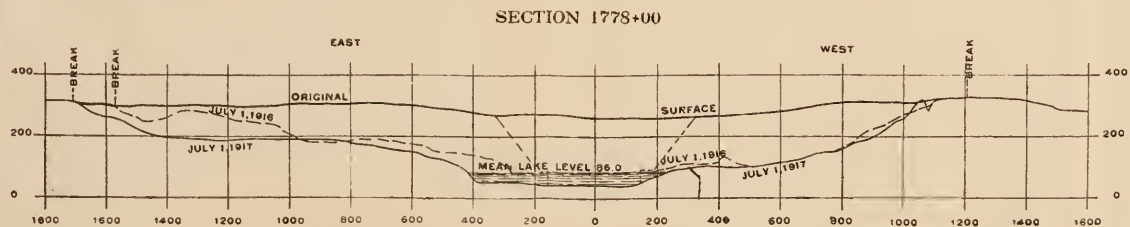
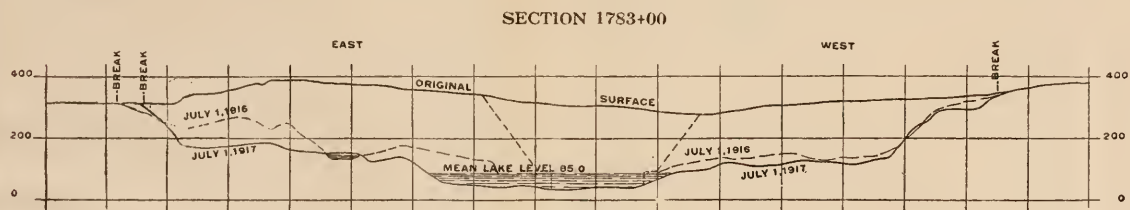
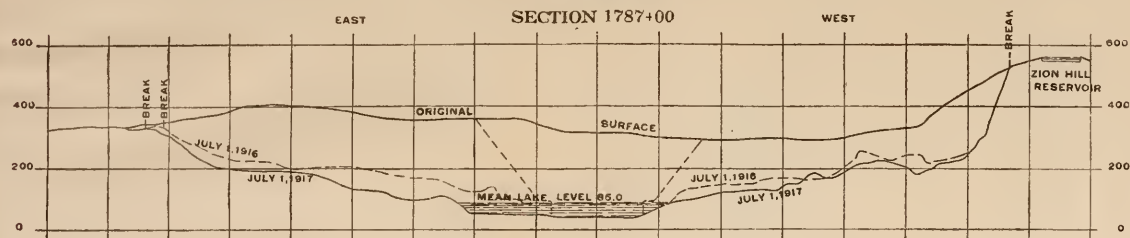
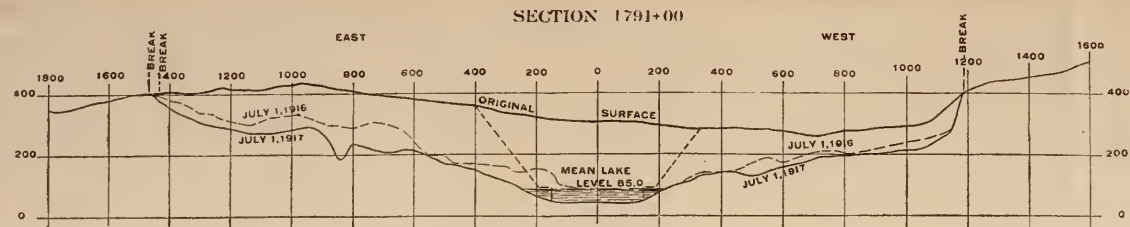


THE PANAMA CANAL
DEPARTMENT OF CREATION AND MAINTENANCE
Engineering Division
TOPOGRAPHY
EAST & WEST CULEBRA
AND
CUCARACHA SLIDES

Scale 1:25,000
Date 1917
Traced by
Checked by
Approved by
Engineer

1917
U.S. GOVERNMENT PRINTING OFFICE: 1917
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THE PANAMA CANAL
DEPARTMENT OF OPERATION & MAINTENANCE
DREDGING DIVISION

TYPICAL CROSS - SECTIONS
CULEBRA SLIDES

MADE BY P.S.
TRACED BY D.R.
CHECKED BY C.L.T.

SCALE - AS SHOWN
JULY 1, 1917

SUBMITTED

[Signature]

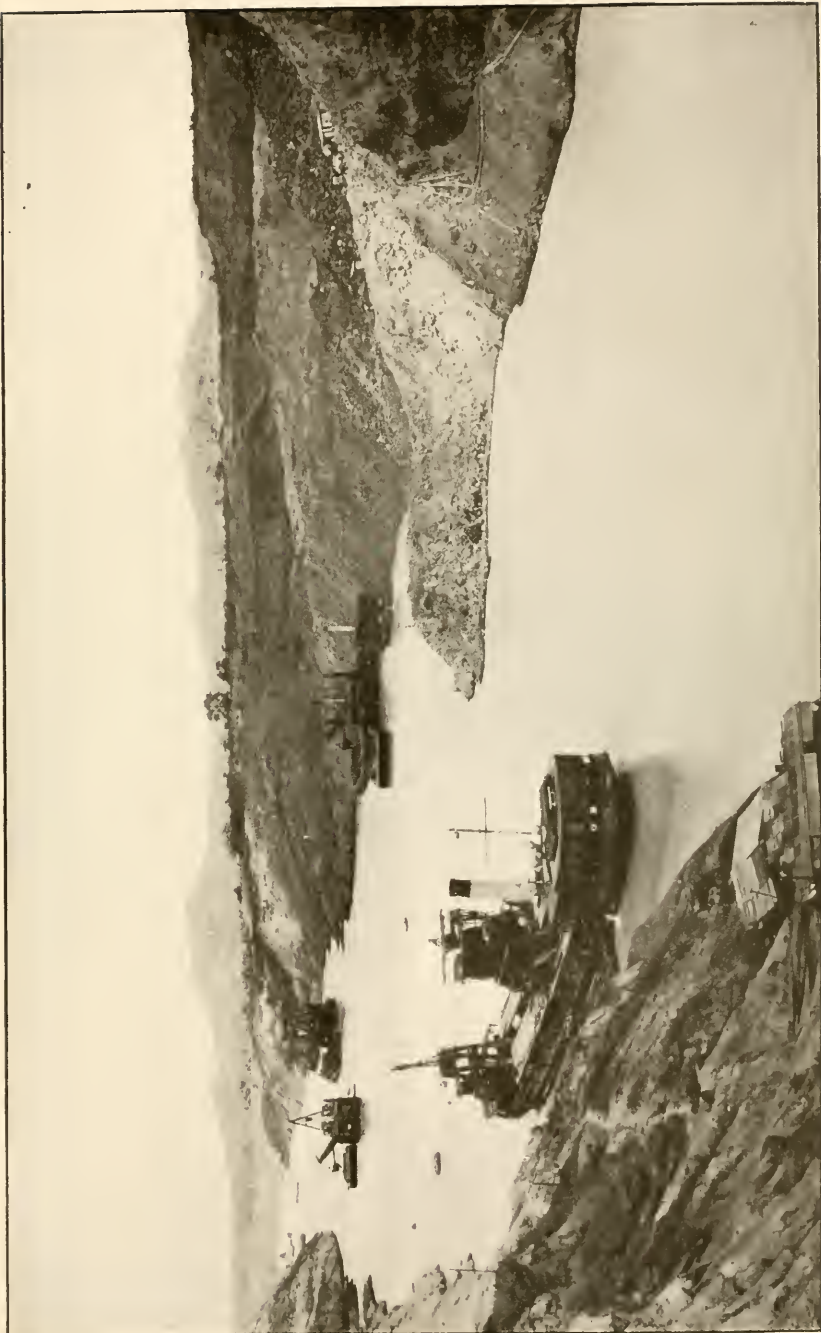
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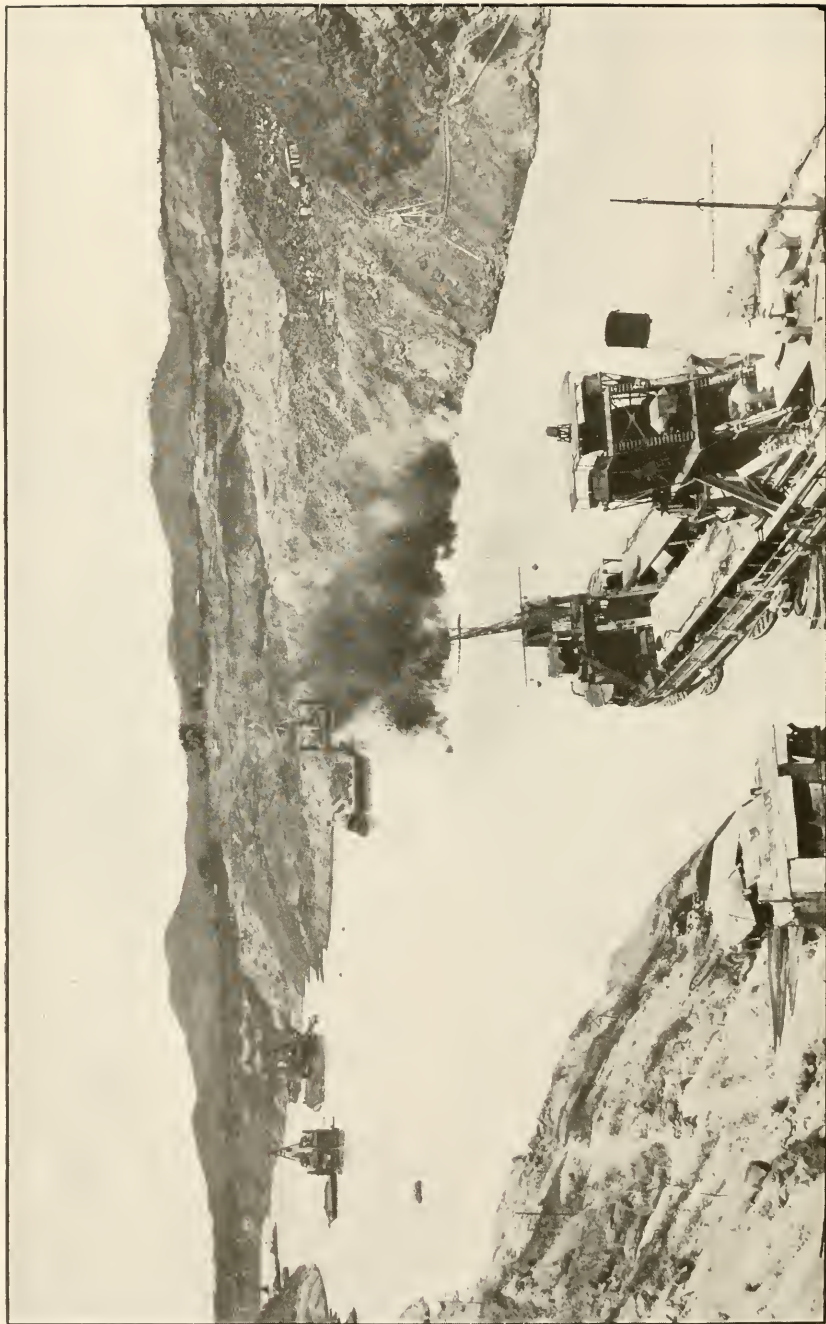
ASSISTANT ENGINEER

ASSISTANT ENGINEER





GAILLARD CUT. EAST BANK SLIDES. LOOKING NORTH FROM WEST BANK, SHOWING DREDGES AT WORK. JANUARY, 1917.



GAILLARD CUT. EAST BANK SLIDES SEEN FROM WEST BANK, SHOWING BLASTING AT FOOT OF GOLD HILL. JANUARY, 1917.



GAILLARD CUT. LOOKING SOUTH FROM EAST BANK, JUNE, 1917.



GAILLARD CUT. EAST AND WEST BANK SLIDES. LOOKING SOUTH. JUNE, 1917.

APPENDIX D.

REPORT OF THE SUPERINTENDENT, MECHANICAL DIVISION.

BALBOA, CANAL ZONE, *July 18, 1917.*

SIR: Complying with instructions of your circular letter of June 18, 1917, I submit herewith the following report relative to the operations of the mechanical division for the fiscal year ended June 30, 1917.

ORGANIZATION.

Until about January 15, 1917, the general organization of the division remained essentially the same as for the previous fiscal year. Since January 15 the organization has been considerably changed to make it as nearly as practicable a functional one in which the various separate activities of the division are each placed under the immediate direct supervision of a specialist, his duties being clearly defined and confined solely to his specialty.

On December 16 Naval Constructor R. D. Gatewood relieved Naval Constructor D. C. Nutting as superintendent; on March 14 Mr. William T. Brown assumed the duties of assistant superintendent vice Mr. James Macfarlane, transferred to his former position as superintendent of dredging, Mr. Macfarlane having acted for a period of about four months as superintendent during the absence of Mr. Nutting on leave.

At the end of the fiscal year the plants of the division included shops, etc., at Balboa, Paraiso, and Cristobal the same as the last fiscal year.

The general character of the work of the division indicated a marked increase toward marine work, work being performed on over 300 vessels, not including tugs, barges, and dredges.

RESULTS ACCOMPLISHED.

Marked progress was made during the year toward the attainment of the ultimate operating condition for the division. The principal needs of the division and the action taken to meet them have been as follows:

(1) To reduce total costs—

Action taken.—Careful analysis of total costs indicated not only that the percentage charged for overhead had been somewhat high, though not excessive, but that the direct labor costs were unduly high. During the last half of the fiscal year the total reduction in the gold and silver rolls of this division has been between 375 and 400 men; in spite of this the volume of uncompleted work now on hand at the plant is materially less than it was in January when the reduc-

tion of force was begun. There has been virtually no protest as regards excessive cost of work for the past five months.

(2) To reduce overhead charges—

Action taken.—It has been found possible to reduce overhead charges from 50 per cent to 40 per cent, effective March 1, and by including the dry dock as a separate shop to still further reduce them to 35 per cent, effective July 1.

(NOTE.—The percentage is applied to direct labor only, no surcharge being applied to material.)

The total overhead charges of the division are made up by a combination of the above-mentioned overhead plus what is called a machine rate. It has also been found possible to reduce the machine rate on all work performed in the machine, forge, and instrument repair shops at Balboa by 25 per cent, effective May 1.

A full discussion of all considerations that have entered into the reduction in overhead charges by this division would be altogether too long for a report of this nature. Briefly, however, it may be stated that the overhead charges of the division prior to January 1, while somewhat high, considering the actual return on the money expended, were not excessive when all items of overhead expense that had entered into the total were carefully analyzed, and particularly when it is considered that the overhead charges include all the salaries of all the officials, clerks, and draftsmen of the division, the full gratuity allowance for leave for all employees, the whole cost of new hand tools and equipment of whatsoever nature, labor-train service for carrying all employees to and from work, telephone service in not only the plant but in the residences of all the principal supervisors, and numerous other minor charges not normally included in the overhead of Government plants.

(3) To concentrate all work possible at Balboa and Cristobal, where adequate repair facilities and equipment were available.

Action taken.—On December 18 the volume of work on hand at Paraiso having materially decreased, arrangements were made to decrease the force there to about one-third its previous size, distributing such part of the force as could be used to advantage among the shops at Balboa and Cristobal and discontinuing all manufacturing work at Paraiso.

(4) To increase volume of outside work or work for individuals and companies to compensate for decreased volume of work on railroad, dredging, and other equipment of The Panama Canal.

Action taken.—Every effort has been made to encourage individuals and companies to bring their work to this plant, and it is believed that every possible consideration has been given them when they have done this. The facilities of the division are available at any time, day or night, to perform emergency work on shipping using the canal. The increased number of vessels on which work has been performed and the increased size of the jobs on many of them is a clear indication that individuals and companies are considering it more and more desirable to have their work performed at the Isthmus. The division has been successful in securing the following work during the past six months:

1. Partly overhaul, change gauge, crate, and prepare for shipment 95 locomotives, which had been purchased by the A. B. Shaw Co.

2. Work in connection with the extensive overhaul of the steamships *Ancon* and *Cristobal*, involving an expenditure of about \$800,000 as soon as the services of these vessels can be spared.

3. Practically all repairs on the steamships of the Panama Railroad and the colliers *Ulysses* and *Achilles* to be made at the Isthmus instead of at New York.

4. Construction of a 120-foot Coast Guard cutter for the Coast Guard Service of the Navy Department.

5. Plans are now being prepared to proceed with the construction of four 50-foot motor sailing launches for the United States Army, modified somewhat from the Navy standard boats, the engines of which will in all probability be manufactured at the Balboa plant.

A marked increase in the amount of work for the Navy Department has been apparent throughout the fiscal year.

No work requested by any individual or company has been refused since January 1, 1917.

(5) To actively prosecute all work being done under capital account, thus increasing the facilities for performing work in the various shops.

Action taken.—Work has been actively pushed to completion during the fiscal year in connection with enlargements and extensions of all shops and buildings, such as the Balboa roundhouse; the instrument repair shop, building No. 9; the new restaurant and pattern shop; the extension to the car shop; the new paint manufacturing plant; the extension to the oxyacetylene plant; the extension to the pipe shop; the completion of all details as regards the dry dock and the central power plant, building No. 29; and the purchase and delivery of new tools and equipment, such as the 120-inch engine lathe in the machine shop, the 42-inch mill and planer for the sawmill, the 50-ton dry-dock crane, additional cells for the oxyacetylene plant, additional air compressors, and numerous additional machine and hand tools.

(6) To reduce overtime and night work.

Action taken.—The night shift, Balboa shops, was abolished May 7.

The effort to reduce overtime to the absolute minimum had resulted, up to the declaration of war with Germany, when an excessive amount of military work had to be completed in a minimum of time, in a lower percentage of overtime than had ever been worked in the history of the division.

Effective February 1, arrangements were made by which the working force of clerks and draftsmen employed in the office building were reduced from eight to seven hours per diem.

Effective December 1, the wages of silver employees were raised and, effective March 1, a material raise was made in gold wages. In spite of this, and in spite of the heavy overtime load thrown on the division by the declaration of war, due to certain consolidations and redistributions of the working force, the abolishment of certain positions, and a careful analysis to determine the actual need for every employee carried on the rolls, the direct labor expenditures for the division for the last half of the fiscal year have not been materially greater than for the first half of the fiscal year.

From all of the above it will be apparent that material progress has been made, by which it has been found possible to materially reduce simultaneously

- (1) The normal direct labor pay rolls;
- (2) The overhead charges;
- (3) The amount of overtime worked by a smaller force;
- (4) The hours for the office force;
- (5) The amount of work performed at night;

and at the same time to complete so satisfactorily the work assigned to the division as to induce an increasing volume of work from individuals and companies and from other departments of the Government.

The above results have been obtained without the reduction of the salary or wages of any employee of the division—in fact, material increase has been made in a number of salaries.

PRINCIPAL WORK PERFORMED.

The principal items of work carried on during the year at Cristobal were the extensive repairs and overhauling of five vessels of the C class of submarines; the fabrication of about 15,000 linear feet of 6-foot diameter conduit for the construction of new piers and 2,000 feet penstock piping for the new hydroelectric station at Gatun; the overhaul of the steamship *General W. C. Gorgas*; and repairs and alterations to steamships of the Panama Railroad.

At Balboa the principal items of work accomplished during the year were extensive repairs to the bottom of the steamship *Lautero*, damaged in transiting the canal, the steamship *Themis*, damaged by running on the west breakwater, the steamship *Nicaraguan*, involving the renewal of practically the entire bottom between the bilge keels and most of the floors and framing in wake of this plating—the work being completed in about 24 working days; extensive overhaul of the tugs *Bolivar* and *Gatun*; construction of two 65-foot dispatch boats for the dredging division; construction of two 85-foot supply boats for the marine division; the manufacture of four towing locomotives for service on the locks; and the large order of railroad equipment for the Alaskan Engineering Commission, involving repair of 15 locomotives, 100 Lidgerwood flat cars, 40 Oliver dumps, 2 steam shovels, and 2 unloaders. In addition to the above, 3 ex-German steamships, the *General G. W. Goethals*, *General H. F. Hodges*, and *General O. H. Ernst* were extensively overhauled and placed in service, and the first vessel left the Balboa plant in all respects ready for taking cargo in less than one month after declaration of war. All German vessels had been completed within 10 weeks after declaration of war. Extensive repairs and docking were completed on the U. S. S. *St. Louis*, U. S. S. *Pueblo*, U. S. S. *Pittsburgh*, U. S. S. *Frederick*, and U. S. S. *South Dakota*; the work of rebabbitting the top and bottom brasses of all main bearings of both engines of the *St. Louis* having been completed in 9 working days. The work of repairing and preparing for shipment the 95 locomotives for the A. B. Shaw Co. is now being proceeded with at the rate of 10 locomotives per month, more than half being completed at the end of the fiscal year. The work of repairing the damaged bottom of the

U. S. S. *Hopkins*, involving removing and replacing in dock of about 25 shell plates and repairs to floors and framing, was completed during the month of June in 15 working days.

GENERAL INTEREST.

The principal other items of interest in connection with the general work of the division during the fiscal year are:

(1) The satisfactory solution of the difficult problem involving the granting of leave provided by Governor's Circular No. 601-59, dated January 25, 1917, quoting Executive order dated January 15, 1917.

(2) The satisfactory operation of dry dock pumps, capstans, crane, and other accessories at Balboa. It is doubtful if a better equipped dock is to be found anywhere in the world. The dry docks at Balboa and Cristobal were filled practically every day of the fiscal year and the expeditious docking of the larger vessels of the Pacific Fleet after the declaration of war gave a good indication of the capabilities of the dock plant. After charging off over \$12,000 as a reserve fund for the maintenance of the dock structure and equipment, there remained at the end of the fiscal year a very large profit as a result of the operations of the docks.

(3) The satisfactory development of the apprenticeship system, even greater progress being expected next year, when the services of an expert instructor can be obtained for coordinating the theoretical and shop work of the 42 apprentices now employed in this division.

(4) The stability and adaptability of the present accounting system to handle costs for the class of work performed by the mechanical division.

(5) The active cooperation of the storekeeping department, under the general supervision of Mr. J. J. Jackson, in efficiently maintaining stock and economically supplying the demands of this division for material.

(6) The marked improvement in the conduct of work and reduction of costs effected at the Cristobal shops under the general supervision of Mr. W. H. Stone.

(7) The change in working hours for the Cristobal shops to agree with Balboa shops, involving the abolishment of the two-hour lunch period and the installation of a lunch room for the gold employees.

(8) The change in working hours at the Paraiso shops to agree with those at Balboa and Cristobal.

(9) The purchase of a steel paling fence for inclosing the Balboa plant.

It is expected that further progress will be made along the lines above indicated in the coming fiscal year.

NEEDS FOR COMING FISCAL YEAR.

The principal needs of the division for the coming year, exclusive of those for which estimates have already been submitted covering purchase of additional machine tool equipment and new building for a rigger's shop and extensions to several existing buildings, are:

(1) The construction at Balboa and Cristobal of additional quarters for gold and silver employees, the lack of which at the present

time is a serious handicap toward maintaining an efficient and satisfied working force.

(2) The construction of new shop and dry-dock facilities at Cristobal concurrently with the work of establishing the new submarine base at Coco Solo. The construction of the new shops and dry dock has been consistently advocated in previous annual reports, in recent monthly reports, and in connection with the last quarterly report to the Secretary of War. Separate report has already been submitted covering the proposed location of these shops, and it is desired to strongly renew the recommendations quoted above for increasing the shop and dry-dock facilities at the Atlantic entrance of the canal.

(3) The removal of the unsightly shed now covering Piers Nos. 15 and 16 and the use of these wharves for repair purposes instead of for commercial use of loading and unloading which should be transferred to Pier No. 18.

(4) The development of the use of native woods, in connection with which it will probably be necessary to install a small sawmill in the Monte Lirio district.

(5) The development of a "safety first" campaign throughout the shops to reduce the number of accidents.

(6) The development of ways and means to provide suitably equipped building ways for the construction of barges or small hulls, which is very desirable in order to retain a uniform force of well-trained mechanics.

Attached hereto are plates and tables as follows showing the various phases of the operation of the mechanical division for the fiscal year 1917:

Plate No. 29. Showing the classes of work and source of revenue.

Plate No. 30. Showing the gross overhead expense percentage of the Balboa shops as compared with the total direct labor.

Table No. 1. Abstract of expenditures and overtime work performed by the entire mechanical division.

Table No. 2. Abstract of expenditures, overtime work performed, and distribution of charges at the Balboa shops.

Table No. 3. Abstract of expenditures, overtime work performed, and distribution of charges at the Cristobal shops.

Table No. 4. Abstract of expenditures, overtime work performed, and distribution of charges at the Paraiso shops.

Table No. 5. Operation of the Balboa shops' foundries.

Table No. 6. Expenditures and output of the oxyacetylene plant, Balboa shops.

Table No. 7. Operation of the Panama Canal dry docks.

Table No. 8. Number of repairs to locomotives.

Table No. 9. Number of shop and field repairs made to the various classes of cars.

Table No. 10. Number of repairs to rolling stock other than locomotives and cars.

Table No. 11. Statement of hostling costs.

Respectfully submitted.

R. D. GATEWOOD,
Superintendent, Mechanical Division.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

TABLE No. 1.—Abstract of expenditures and overtime work performed by the entire mechanical division.

Month.	Abstract of expenditures.				Overtime.		Force on pay roll.	
	Labor.	Material.	Other expense.	Total.	Amount.	Per cent of total.	Gold.	Silver.
1916.								
July.....	\$202,831.89	\$154,733.96	\$19,861.99	\$377,427.84	\$12,166.70	6.00	1,000	1,956
August.....	223,099.31	207,855.97	30,249.28	461,204.56	23,436.22	10.50	985	1,973
September.....	214,717.82	150,100.34	27,194.34	392,102.50	23,581.07	10.98	985	2,109
October.....	210,714.58	191,490.46	30,040.64	432,245.68	20,831.08	9.89	1,016	2,473
November.....	222,101.42	164,613.83	31,031.52	417,746.77	18,738.20	8.44	1,031	2,302
December.....	223,452.07	172,041.83	31,736.82	427,230.72	18,543.84	8.30	1,062	2,235
1917.								
January.....	227,774.82	215,560.00	33,442.51	476,777.33	17,658.00	7.75	1,080	2,165
February.....	206,177.92	173,473.62	16,731.98	396,383.52	18,831.33	9.13	1,018	2,024
March.....	224,325.55	156,922.88	26,437.78	407,686.21	12,141.08	5.41	1,001	1,941
April.....	206,281.74	169,740.73	26,825.71	402,848.18	13,026.00	6.31	967	2,165
May.....	1238,105.85	217,390.88	17,892.56	503,379.29	24,123.65	110.13	934	2,011
June.....	1,222,940.81	155,213.49	23,693.46	401,847.76	23,763.10	110.66	973	1,934
Total.....	2,622,523.78	2,159,217.99	315,138.59	5,096,880.36	226,840.27	8.65	1,066	2,107
Average per month this year.....	218,543.65	179,934.83	26,261.55	424,740.03	18,903.36	8.65		
Average per month last year.....	186,693.94	154,229.29	30,169.62	371,092.85	18,274.21	9.79		

¹ High on account of abnormal overtime required on military work due to war with Germany and the prevention of normal leaves and discharges while this urgent work is in progress.

TABLE NO. 2.—Abstract of expenditures, overtime work performed, and distribution of charges at Balboa shops.

Month.	Abstract of expenditures.				Overtime.	
	Labor.	Material.	Other expense.	Total.	Amount.	Per cent of total.
1916.						
July.....	\$125,447.07	\$113,648.70	\$16,165.77	\$255,261.54	\$2,813.54	2.25
August.....	136,072.59	154,126.12	23,794.19	313,992.90	9,992.33	7.34
September.....	147,354.49	109,950.56	19,501.38	276,806.43	16,720.65	11.35
October.....	140,345.74	143,165.63	21,442.10	304,953.47	13,568.02	9.67
November.....	150,649.42	126,110.67	20,969.34	297,729.43	12,670.31	8.41
December.....	156,031.80	137,866.04	23,754.67	317,652.51	13,268.11	9.79
1917.						
January.....	162,131.04	188,692.77	25,204.90	376,028.71	11,692.33	7.21
February.....	150,921.25	154,456.24	10,081.14	315,458.63	14,746.16	9.77
March.....	155,032.91	134,464.29	17,992.08	307,489.28	6,400.97	4.17
April.....	143,751.85	145,933.52	19,050.06	308,735.43	6,278.85	4.37
May.....	172,795.34	201,695.02	12,465.81	386,956.17	18,833.43	10.90
June.....	161,153.10	132,829.06	18,681.22	312,663.38	13,945.36	8.65
Total.....	1,801,686.10	1,742,953.62	229,102.66	3,773,747.38	142,996.06	7.94
Average per month this year.....	150,140.51	145,246.55	19,091.89	314,478.95	11,916.34	7.94
Average per month last year.....	116,261.51	110,923.14	18,592.36	245,777.01	8,282.08	7.12

DISTRIBUTION OF CHARGES.

(Completed work only.)

Panama Canal.....	\$1,920,954.58
Panama Railroad.....	1,057,435.87
Individuals and companies, miscellaneous.....	467,222.28
Navy Department, U. S. A.....	63,697.73
War Department, U. S. A.....	13,508.31

TABLE No. 3.—Abstract of expenditures, overtime work performed, and distribution of charges at Cristobal shops.

Month.	Abstract of expenditures.				Overtime.	
	Labor.	Material.	Other expense.	Total.	Amount.	Percent of total.
1916.						
July.....	\$38,059.34	\$16,275.06	\$414.45	\$54,748.85	\$2,656.90	6.88
August.....	45,338.22	10,222.64	2,506.08	58,066.94	6,370.12	14.05
September.....	38,426.84	13,979.13	5,436.96	57,842.93	1,952.68	5.08
October.....	44,911.93	24,479.02	4,971.56	74,362.51	3,555.20	8.05
November.....	46,506.86	18,112.05	5,570.78	70,189.69	3,707.54	7.97
December.....	48,546.64	16,324.51	4,836.03	69,707.08	2,780.18	5.73
1917.						
January.....	54,730.49	14,589.07	5,918.09	75,237.65	5,245.02	9.58
February.....	45,732.43	15,149.17	5,588.11	66,470.71	3,703.67	12.34
March.....	53,612.64	15,100.55	7,336.01	76,049.20	3,891.26	6.43
April.....	52,977.66	17,301.15	6,613.96	76,192.67	6,042.63	11.96
May.....	53,859.11	32,469.11	4,652.48	90,980.70	4,854.31	8.51
June.....	52,557.46	18,068.80	3,871.78	74,498.04	9,205.47	17.51
Total.....	576,559.42	212,070.26	57,717.89	846,347.57	53,396.98	9.26
Average per month this year.....	48,046.62	17,672.52	4,809.82	70,528.96	4,449.75	9.26
Average per month last year.....	35,187.12	12,570.99	5,162.67	52,920.78	4,807.21	13.66

DISTRIBUTION OF CHARGES.

(Completed work only.)

Panama Canal.....	\$458,747.36
Panama Railroad.....	\$88,867.95
Individuals and companies, miscellaneous.....	177,332.70
Navy Department, U. S. A.....	222,388.79
War Department, U. S. A.....	19,862.57

TABLE NO. 4.—Abstract of expenditures, overtime work performed, and distribution of charges at Paraiso shops.

Month.	Abstract of expenditures.				Overtime.	
	Labor.	Material.	Other expense.	Total.	Amount.	Per cent of total.
1916.						
July.....	\$39,325.48	\$24,810.20	\$3,281.77	\$67,417.45	\$6,661.26	17.02
August.....	41,688.50	43,507.21	3,949.01	89,144.72	7,073.77	16.97
September.....	28,936.49	25,760.65	2,256.00	57,453.14	4,907.74	16.96
October.....	25,436.91	23,845.81	3,626.98	52,929.70	3,706.86	14.56
November.....	24,945.14	20,301.11	4,491.40	49,737.65	2,360.35	9.46
December.....	18,873.73	17,851.28	3,146.12	39,871.13	495.55	2.63
1917.						
January.....	10,913.29	12,278.16	2,319.52	25,510.97	720.65	6.60
February.....	3,324.24	3,868.21	1,061.73	14,454.18	379.50	3.98
March.....	13,680.00	7,338.04	1,103.09	22,147.13	2,088.85	15.27
April.....	10,232.83	6,486.06	1,161.69	17,900.58	704.32	6.57
May.....	11,431.40	13,216.75	774.27	25,442.42	705.91	6.16
June.....	9,230.25	4,315.63	1,140.46	14,686.34	612.37	6.63
Total.....	244,278.26	204,189.11	28,318.04	476,785.41	30,447.33	12.46
Average per month this year.....	20,356.52	17,015.76	2,359.83	39,732.11	2,537.28	12.46
Average per month last year.....	31,831.16	19,234.21	5,201.91	56,267.28	4,676.82	14.69

DISTRIBUTION OF CHARGES.

(Completed work only.)

Panama Canal.....	\$472,662.01
Panama Railroad.....	3,661.25
Navy Department, U. S. A.....	53.05
War Department, U. S. A.....	56.20

TABLE NO. 5.—Operation of the Balboa shops' foundries.

Item.	July, 1916, to January, 1917.	January, 1917, to July, 1917.	Total, 1916-17.	Total, 1915-16.
BRASS FOUNDRY.				
(Output in pounds.)				
Aluminum.....	91	93	184	261
Babbitt.....	200		200	361
Brass.....	86,698	96,575	183,273	184,121
Bronze.....	42,652	16,522	59,174	44,942
Bronze, phosphorous.....	3,430	1,341	4,771	10,706
Bronze, hard.....	1,481	484	1,965	3,292
Bronze, manganese.....	479	402	881	6,508
Bronze, special.....				603
Bronze, white.....				15
Copper.....	29	25	54	239
Lead.....	96	542	638	1,361
Metal, brazing.....	798	830	1,628	4,120
Metal, white, low grade.....				59
Metal, white, high grade.....				320
Tin.....	71	29	100	28
Zinc.....	1,090		1,090	63
Total output..... pounds..	137,115	116,843	253,958	256,999
Number of patterns.....	215	236	481	349
Number of castings.....	7,825	8,006	15,831	13,283
Indirect expenditures.....	\$29,132.04	\$23,007.86	\$52,139.90	\$40,388.26
Direct labor.....	\$2,229.08	\$2,028.54	\$4,257.62	\$4,181.11
IRON FOUNDRY.				
Output..... pounds..	996,743	954,577	1,951,320	2,101,908
Number of patterns.....	371	334	705	690
Number of castings.....	13,465	19,341	32,806	32,104
Indirect expenditures.....	\$24,578.16	\$25,672.33	\$50,250.49	\$50,566.04
Direct labor.....	\$7,295.66	\$7,392.36	\$14,688.02	\$18,580.05
STEEL FOUNDRY.				
Output..... pounds..	1,088,483	951,427	2,039,910	1,502,625
Number of patterns.....	191	141	332	389
Number of castings.....	5,613	6,483	12,096	11,112
Indirect expenditures.....	\$79,644.63	\$70,767.88	\$150,412.51	\$90,956.79
Direct labor.....	\$10,771.71	\$9,531.28	\$20,602.99	\$14,458.23
GRAND TOTAL.				
Output..... pounds..	2,222,341	2,022,847	4,245,188	3,861,532
Number of patterns.....	807	815	1,622	1,428
Number of castings.....	26,903	33,830	60,733	56,499
Indirect expenditures.....	\$133,354.83	\$119,448.07	\$252,802.90	\$195,180.18
Direct labor.....	\$20,296.45	\$19,252.18	\$39,548.63	\$37,219.39

TABLE NO. 6.—Expenditures and output of the oxyacetylene plant, Balboa shops.

	Total expenditures.	Output of oxygen.	Output of acetylene.	Output of hydrogen.
1916.				
July.....	\$5,149.52	<i>Cubic feet.</i> 42,600	<i>Cubic feet.</i> 35,198	<i>Cubic feet.</i>
August.....	5,633.45	54,200	40,176	.....
September.....	10,204.49	90,200	50,281	7,161
October.....	10,275.63	97,100	50,048	3,777
November.....	10,683.69	91,100	37,728	11,698
December.....	11,389.37	101,600	54,727	15,730
1917.				
January.....	8,396.01	98,800	53,264	1,950
February.....	2,370.07	94,200	46,043	400
March.....	4,399.31	126,775	66,036	1,400
April.....	3,218.94	97,000	56,153	1,100
May.....	2,117.96	98,300	57,995	4,600
June.....	2,337.20	107,500	59,000	3,400
Total.....	76,175.64	1,099,378	606,649	51,216
Average per month this year.....	6,347.97	91,615	50,554	4,268
Average per month last year.....	3,591.48	36,951	27,068	.....

TABLE No. 7.—Operation of Panama Canal dry docks.

BALBOA.

Month.	Operating expense.	Vessels docked.				
		Panama Canal.	War and Navy.		Commercial.	
		Number.	Number.	Tonnage.	Number.	Tonnage.
1916.						
July.....	\$1,318.20					
August.....	2,090.45	1			3	9,978
September.....	3,802.89	3	1	9,700		
October.....	2,161.86	7	1	235		
November.....	5,767.37	3	1	153	3	5,559
December.....	5,898.96	3			1	8,566
1917.						
January.....	4,109.29	4			2	8,512
February.....	3,670.31	3				
March.....	4,806.74	5	1	675	1	3,716
April.....	3,846.86		1	9,700	5	17,091
May.....	8,448.62	3	9	73,309	2	12,650
June.....	5,493.42	2	1	408	1	7,235
Total.....	54,414.97	34	15	94,180	18	73,307

CRISTOBAL.

1916.						
July.....	\$2,379.31	11	.....	.....	1	1,283
August.....	2,274.53	7	1	100	2	2,618
September.....	2,543.47	6	1	100	1	184
October.....	1,659.40	.....	3	300	.....	.....
November.....	1,236.66	2	1	100	.....	.....
December.....	880.34	5	1	128	1	653
1917.						
January.....	1,284.55	2	.....	.....	2	2,402
February.....	1,387.23	1	2	265	2	1,417
March.....	1,254.05	4	2	200	1	1,190
April.....	1,301.74	4	2	430	1	1,231
May.....	1,857.65	3	.....	.....	2	2,211
June.....	1,871.90	6	3	940	2	2,903
Total.....	19,930.83	51	16	2,563	15	16,097

TABLE No. 8.—Number of repairs to locomotives.

Month.	Running.	Heavy.	Total.
1916.			
July.....	1,247	.....	1,247
August.....	1,298	3	1,301
September.....	1,228	.....	1,228
October.....	1,244	2	1,246
November.....	1,066	1	1,067
December.....	724	.....	724
1917.			
January.....	1,159	.....	1,159
February.....	1,188	.....	1,188
March.....	1,208	.....	1,208
April.....	922	.....	922
May.....	933	.....	933
June.....	945	.....	945
Total.....	13,162	6	13,168
Average per month this year.....	1,096.83	.5	1,097.33
Average per month last year.....	1,304.17	2.33	1,306.50

TABLE No. 9.—Number of shop and field repairs made to the various classes of cars.

Equipment.	Number of shop repairs.	Number of field repairs.	Total.
Lidgerwood flat cars.....	1,068	6,435	7,503
Steel dump cars.....	2,374	17,993	20,367
Labor cars.....	366	455	821
Steel flats.....	601	2,604	3,205
Miscellaneous.....	2,460	24,470	26,930
Total.....	6,869	51,957	58,826
Average per month this year.....	572	4,330	4,902
Average per month last year.....	779	5,880	6,659

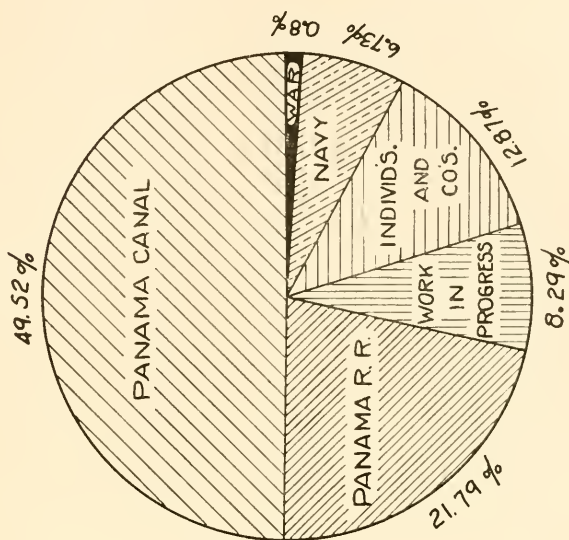
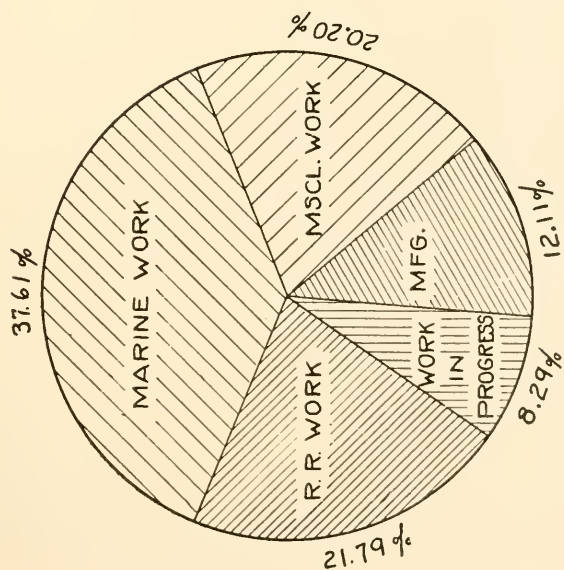
TABLE No. 10.—Number of repairs to rolling stock other than locomotives and cars.

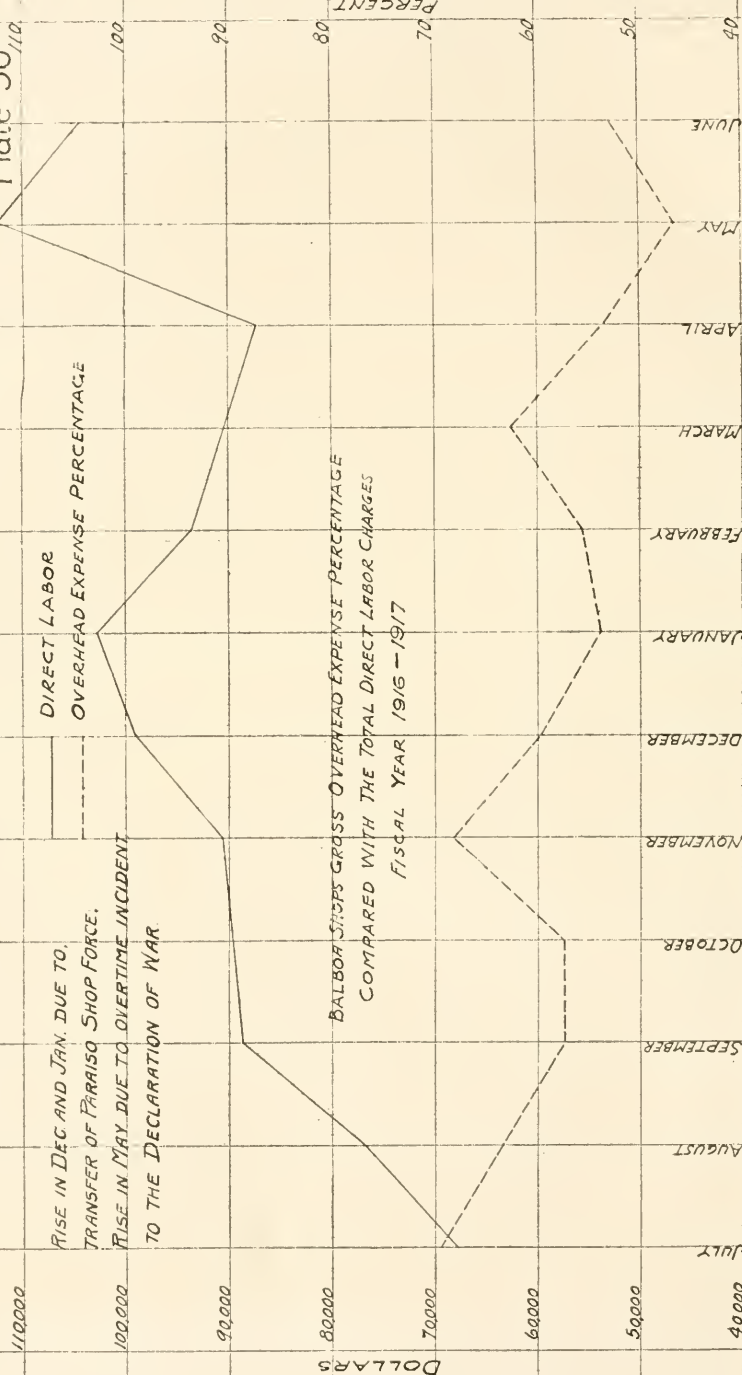
Month.	Cranes.	Track shifters.	Unloaders.	Spreaders.	Others.	Total.
1916.						
July.....	21			2	2	25
August.....	23					23
September.....	22					22
October.....	17				2	19
November.....	22		5		1	28
December.....	14	1	14	2	3	34
1917.						
January.....	24		8	1		33
February.....	38		5		2	45
March.....	30			1		31
April.....	27					27
May.....	23					23
June.....	28					28
Total.....	294	1	32	6	10	343
Average per month this year.....	24.50	.083	2.67	.50	.83	28.58
Average per month last year.....	21.17	.50	.33	2.75	1.50	26.26

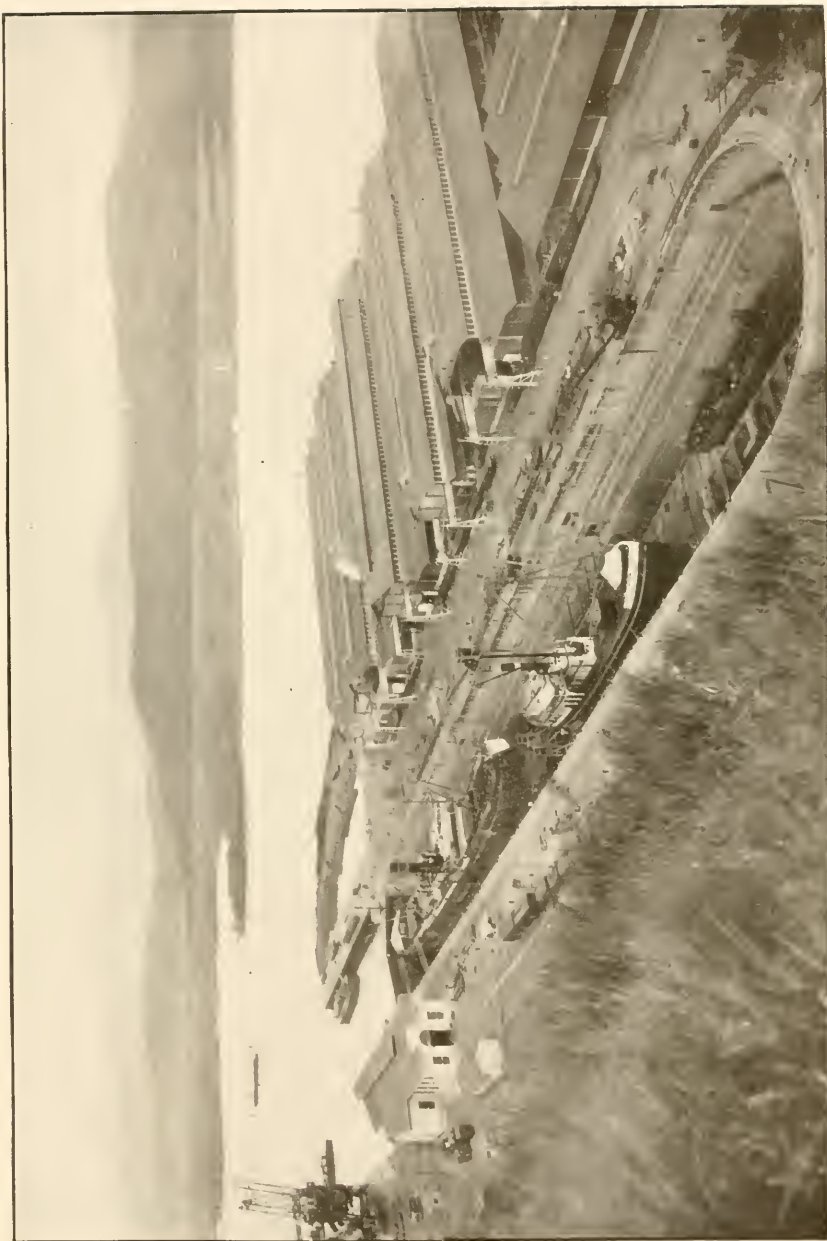
TABLE No. 11.—Statement of hostling costs.

Month.	Hos- tlings.	Direct labor.	Sur- charge.	Material and service.	Total cost.	Average labor.	Average total cost per hostling.
1916.							
July.....	4,387	\$2,317.78	\$1,387.19	\$95.43	\$3,800.40	\$0.52833	\$0.82234
August.....	4,350	2,261.39	1,065.20	260.68	3,587.27	.51986	.82466
September.....	3,912	2,227.05	1,200.72	176.14	3,603.91	.58928	.92124
October.....	3,724	2,287.42	1,227.82	376.41	3,891.65	.61424	1.04502
November.....	2,955	1,812.95	891.08	155.31	2,859.34	.61352	.96763
December.....	2,946	1,971.08	965.95	199.24	3,136.27	.66907	1.06460
1917.							
January.....	2,711	2,174.60	1,025.70	343.37	3,543.67	.80214	1.30690
February.....	2,417	1,907.40	955.51	157.55	3,020.46	.78916	1.24967
March.....	2,429	1,924.73	758.69	284.47	2,967.89	.79239	1.22186
April.....	2,091	1,634.11	637.97	274.30	2,546.38	.78149	1.21778
May.....	2,042	1,528.56	606.95	275.47	2,410.98	.74556	1.18069
June.....	2,082	1,570.57	628.23	274.39	2,473.19	.75435	1.18789
Total.....	36,046	23,617.64	11,351.01	2,872.76	37,841.41	.65521	1.04981
Average per month this year.....	3,004	1,968.14	945.92	239.39	3,153.45	.65521	1.04981
Average per month last year.....	4,413.5	2,652.70	1,350.49	211.25	4,214.44	.61991	.95490

CHARTS SHOWING CLASSES OF WORK AND SOURCE OF REVENUE







BALBOA DRY DOCK NO. 1. FROM SOSA HILL. DECEMBER, 1916.



PACIFIC TERMINAL, SHOWING MECHANICAL SHOPS, DRY DOCK, AND CRATING STATION, JUNE, 1911.

APPENDIX E.

REPORT OF THE CHIEF QUARTERMASTER, SUPPLY DIVISION.

BALBOA HEIGHTS, CANAL ZONE, *July 20, 1917.*

SIR: I have the honor to submit the following report of the operations of the supply department for the fiscal year ended June 30, 1917.

ORGANIZATION.

The organization of the department has continued substantially unchanged as set forth in the annual report for 1916, the following changes having been made in the personnel:

Capt. F. H. Smith was on July 15, 1916, placed in charge of all matters connected with making pastures, importing and pasturing cattle. Dr. W. J. Taylor was appointed supervisor, cattle industry, effective November 22, 1916, and Mr. L. A. Byrnes was made general foreman of all clearing and construction work in connection with the pastures on September 19, 1916. On August 1, 1916, Mr. R. K. Morris was appointed general manager, commissary division. Mr. J. J. Jackson was appointed general storekeeper, effective August 1, 1916, vice Mr. R. K. Morris, promoted to general manager, commissary division. Mr. D. W. MacCormack was appointed superintendent of manufacturing plants and wholesale units of the commissary division, effective January 1, 1917. Mr. R. A. Brayton was appointed chief clerk in the office of the general manager, effective January 1, 1917, vice Mr. C. A. Gilmartin, appointed products buyer and transferred to Costa Rica. Mr. V. T. Cornwell was appointed chief commissary inspector, effective January 1, 1917, to fill vacancy made by transfer of Mr. D. W. MacCormack to other duties. Mr. J. H. Keefe, who was relieved as products buyer in Costa Rica by Mr. C. A. Gilmartin, was transferred to a similar position and sent on a trip of inspection of the markets on the west coast of South America. Mr. O. W. Barrett, agronomist, resigned, effective March 8, 1917, and position was then abolished. Mr. J. D. Eason was appointed general foreman of plantations, effective February 13, 1917, vice Mr. J. H. Bryan, resigned. Mr. B. E. McKeever was appointed manager of branch commissary at Balboa, effective January 1, 1917. On August 1, 1916, the Cristobal dry dock store and the Mount Hope obsolete store were consolidated into one accountability, under the supervision of one storekeeper, and styled the Cristobal store, with Mr. R. B. Groves in charge as storekeeper. Mr. L. J. Stapleton, storekeeper of the dry dock store, was transferred to Paraiso store as storekeeper, effective August 16, 1917, vice Mr. E. M. Reinhold, transferred to office of district quartermaster, Balboa Heights.

LABOR.

There was a surplus in all grades of silver labor throughout the year. The total force employed June 30, 1917, was 24,146, as compared with 23,462 employed on June 30, 1916, showing an increase of 684. The largest working force at any one time during the year was in July, 1916, when the total was 26,539. Repatriation of those for whom it was impossible to find employment was continued throughout the year. No contract laborers were recruited during the year.

QUARTERS.

There was a total for all towns of 736 applications for family quarters on file June 30, 1916. On June 30, 1917, there remained on file the following number of applications for family quarters:

Ancon-Balboa district	126
Paraiso-Pedro Miguel district.....	8
Gatun district	2
Cristobal district	121
Total	257

One hundred and five apartments at New Cristobal will be finished in July, thus reducing Cristobal applications to 16, making a total of 151 applications remaining on file, as against 736 not provided for last year.

The following family quarters for gold and silver employees were completed during the year with the exception of the New Cristobal and Mount Hope houses, which will be finished in July, 1917: Gold employees—1 four-family, concrete, Colon Beach; 4 four-family, concrete, Balboa; 75 four-family, frame, Ancon-Balboa; 12 four-family, frame, Pedro Miguel; 19 four-family, frame, Cristobal; 100 cottages, frame, Ancon-Balboa; 25 cottages, frame, New Cristobal; 16 cottages, frame, Pedro Miguel. Silver employees—20 twelve-family, frame, Pedro Miguel; 4 twelve-family, frame, Gamboa; 2 twelve-family, frame, Monte Lirio; 3 twelve-family, frame, Mount Hope; 1 special, frame, Brazos Brook; 2 bachelor quarters, frame, Gamboa, making a total of 585 new apartments for gold employees and 353 for silver employees.

New furniture was purchased and supplied new gold-family quarters. Electric ranges and water heaters were installed for experimental purposes in a number of quarters, but sufficient data are not yet available to determine the desirability of substituting electricity for coal in all quarters.

With the completion during the month of July, 1917, of those quarters shown above, we should have sufficient family quarters at Ancon, Balboa, Pedro Miguel, and Gatun for future use, but at Cristobal a shortage may continue until more are erected. All districts will be somewhat cramped for a year or two, but decreases in the number of employees in some divisions should ultimately reduce the force so that at this time no further building of family quarters would be warranted except at Cristobal.

Many of our gold quarters are in old French buildings which cost more to repair than they are worth, and it is believed that the policy of the canal should be to replace each year with concrete quarters a number of these old buildings.

We should have some official houses on Colon beach, as almost all of the official houses are now located in a section of Cristobal which has become such a business center that it is no longer a desirable place in which to live, the group of houses which have been used for official purposes being near the docks and switching operations and are being gradually crowded out by business connected with the terminals. It is quite evident that within a few years the building area in Cristobal will largely be required for business purposes, and family quarters should gradually be rebuilt at New Cristobal on account of better living conditions and proximity to schools for the children. The bachelors, however, have always preferred to live in Cristobal on account of convenience to their work, and it is believed that accommodations should continue to be provided for them in that section.

Bachelor quarters are not adequate at either terminus for men or women, and we should increase our bachelor quarters by erecting enough concrete buildings to provide a room for each bachelor.

Silver quarters are also inadequate, and we should by all means build enough quarters to house all permanent employees on the Canal Zone. Silver employees living in canal family quarters are far more contented workmen, and as we can afford to rent them quarters at much lower rates than they must pay in the cities of Panama and Colon, there is a direct saving of money to the wage earner, and no loss to the Government, when we provide his quarters.

ZONE SANITATION.

The collection and disposal of garbage and night soil, and the cutting of grass continued under the supervision of this department throughout the year, except at Cristobal and Mount Hope, where it continued under the health department. The cost of work done by the supply department, account of Zone sanitation, for the year ending June 30, 1916, was \$45,167.20 and for the fiscal year ending June 30, 1917, was \$29,481.91.

CORRALS.

There was a decreased demand for animal-drawn vehicles, principally in the municipal engineering and building divisions. The teams released by these two departments were transferred to our truck gardens and plantations.

Several new trucks and Ford passenger automobiles were purchased and placed in service, making the following totals now operated by all departments:

Ford trucks.....	40	Ford passenger cars.....	13
1-ton trucks.....	2	Combination.....	1
1½-ton trucks.....	6	1-ton Buick.....	1
3½-ton trucks.....	13		
3½-ton trucks, electric.....	3	Total.....	79

Animals that died and were destroyed during the fiscal year 1917 totaled 22 horses and 38 mules. One horse was sold. Animals in corrals June 30, 1917: One hundred and eighty-three horses, 350 mules—total 533. Seventy-five animals were purchased. Of the above animals 134 horses and 51 mules were in pasture and plantation corrals.

MATERIAL AND SUPPLIES.

A total of 1,347 requisitions was prepared and forwarded to the general purchasing officer, as compared with 1,776 during the preceding fiscal year. The total value of material received during the fiscal year was \$10,817,106.51, as compared with \$9,945,390.32 for the preceding fiscal year, the increase being due to the increased cost of all material. The local purchases amounted to \$1,516,914.79, as compared with \$1,569,812.15 for last year.

The total tonnage of material received was 335,464 short tons, exclusive of lumber, piling, spud timbers, etc., as compared with 404,569 tons for 1915-16. Material consigned to The Panama Canal came forward in 338 steamers.

During the fiscal year there was a marked increase in price of all staple articles of material.

OPERATION OF STORES.

On June 30, 1917, the value of material in stock was \$6,326,611.90, as against \$4,198,392.34 on June 30, 1916, not including the stock of obsolete material and scrap. The following statement shows material on hand at beginning and end of year and total of all issues from the different storehouses for 1916 and 1917, exclusive of obsolete material and scrap:

	General storehouse.	Cristobal storehouse.	Paraiso storehouse.	Total.
On hand June 30, 1916.....	\$3,083,123.20	\$356,221.92	\$759,047.12	\$4,198,392.34
On hand June 30, 1917.....	4,017,836.54	1,373,259.50	935,515.86	6,326,611.90
Issued 1915-16.....	7,194,241.19	811,364.49	1,022,958.39	9,028,564.07
Issued 1916-17.....	8,776,519.45	2,015,851.89	1,291,554.91	12,083,926.25

The increase in value of stock as compared with June 30, 1916, may be attributed to a number of causes; first, the increasing cost of all material and supplies as against the markets of one year ago; second, large stocks of paints, rope, etc., it is now necessary to carry for sale to steamships; third, greatly increased stocks of gasoline, oils, grease, etc., it being desired, owing to war conditions, to carry at least six months' supply on hand at all times; fourth, the increased amount of ship work being performed by the mechanical division has made it necessary to materially increase our stock of steel.

Sales.—Table No. 13 covers the total of all classes of sales made on the Isthmus for the year, showing 22,994 sales, amounting to \$593,623, or an increase of \$157,543.20 over the previous year. Sales to steamships show an increase of \$180,755.41, and 1,648 vessels were handled as compared with 860 in 1915-16.

Sales to the United States Army amounted to \$211,466.05 and sales to the United States Navy to \$27,760.38. The principal items sold were lumber, building material, general hardware, gasoline, and kerosene. The Army provided for their own requirements in the way of forage, with the exception of straw.

During the year a total of 285,477 requisitions and foreman's orders was handled, distributed as follows:

General storehouse	187,522
Cristobal storehouse	63,029
Paraiso storehouse	34,926

The consumption of cement for the year was 270,053 barrels.

Surplus and obsolete material, equipment, and scrap.—The Mount Hope obsolete storehouse, under the supervision of the storekeeper, Cristobal store, was operated as during the previous year, as a concentration point for obsolete and surplus material, equipment, and scrap.

Table No. 18 shows the status of obsolete and surplus material at the beginning and end of the fiscal year, and the receipts and issues during this period, with the balance on hand June 30, 1917.

Scrap.—Table No. 17 covers American scrap operations during the fiscal year 1917.

Fuel-oil plants.—The contract with the Standard Oil Company of California which called for fuel oil delivered at Cristobal at \$1.05 per barrel and at Balboa at \$0.92 per barrel expired on June 30, 1917. There is one more order due under this contract, which calls for delivery at Balboa of 85,000 barrels on or before August 3, 1917.

Contracts to furnish fuel oil for the fiscal year 1918 were entered into with the Standard Oil Company of California for 700,000 barrels for delivery at Balboa at \$1.60 per barrel and with the Atlantic Refining Co. for 240,000 barrels for delivery at Cristobal at \$2.09 per barrel.

Two 55,000-barrel capacity tanks were leased from the Panama Canal Storage Corporation, one at Cristobal and one at Balboa, at an annual rental of \$4,500. This lease expires on September 1, 1917, at which time the tanks will be released.

The West India Oil Co. completed the construction of a 65,000-barrel capacity tank at Balboa. The construction of the 55,000-barrel tank for The Panama Canal at Cristobal was completed.

It has been decided to use Pier No. 4, Balboa, as an oil crib, and the necessary arrangements have been made for pipe connections, so that steamers can discharge or load at this pier.

Table No. 16 shows the fuel oil storage facilities at Balboa and Mount Hope tank farms as of June 30, 1917. Table No. 15 shows total fuel oil handled by both plants, in amount 2,975,223 barrels for 406 vessels, or an increase of 96 vessels and 719,104 barrels as compared with the previous year.

Gasoline storage.—Storage of bulk gasoline in tank No. 31, Balboa, was continued during the year. Drums were filled from this tank for shipment to canal divisions for a short time when the stock of gasoline drums was depleted.

Panama Canal storage tank No. 37 at Mount Hope, capacity 210,000 gallons, was utilized on June 20, 1917, for storage purposes.

SUBSISTENCE.

The supply department continued during the fiscal year the operation of the Washington and Tivoli Hotels and of the line restaurants and laborers' messes. The Aspinwall Hotel was closed on July 1, 1916; was opened again on January 2, 1917; and was closed to patrons on April 12, 1917, becoming a detention camp for German internes. The Hotel Washington is owned and financially supported by the Panama Railroad Company. All of the remainder are entirely supported by The Panama Canal. The general method of ad-

ministration was the same as that followed during the past. Capt. F. H. Smith, assistant chief quartermaster, has been in direct charge of the hotels. The steamship lines operating down the west coast of South America having made Colon their terminal point, the business of the Hotel Washington has shown a marked increase, much of this at the expense of the Tivoli. Prior to the 1st of February the tourist traffic at both hotels was heavy and there was promise of a still further increase, but the war agitation and subsequent declaration of war interfered with and gradually completely stopped all tourist business.

The net revenue for the year from restaurants and messes was \$641,067.59, a decrease of \$19,950.31 from last year, while the total cost of operations was \$634,150.33, a decrease of \$14,415.06, making a profit of \$6,917.26, a decrease of \$5,535.25 from last year. Had the charges for building repairs, fuel, light, etc., been made, a net loss of \$9,056.60 would have been shown. No charge for equipment has been made, the charge being absorbed by allotments of The Panama Canal.

The ratio of supplies consumed to revenue was 0.41 per cent more than last year. The ratio of total cost of operation to revenue was 0.81 per cent more than last year, making the percentage of profit to revenue 0.81 less than last year. The net expenses for salaries and wages was \$79,754.46, an increase of \$1,758.67, making the proportion of net pay roll to revenue 12.40 per cent, or 0.60 per cent more than last year.

The above record for restaurants and messes includes the operations of the Aspinwall Hotel on Taboga Island up until the time it was closed, April 12, 1917.

The plans for rebuilding the restaurants were completed and three of them have been built; the ones at Balboa, at Cristobal, and at Gatun. That at Ancon is practically completed and the Balboa shop lunch room will be finished before September 1. Rebuilding at Pedro Miguel has been suspended until the needs of the community could be more accurately determined.

The restaurant at Gatun has been turned over to the bureau of playgrounds and clubhouses for operation in connection with their clubhouse. This was done because of the small amount of total business and of the convenience of combining their lunch-counter service with the restaurant.

The Tivoli Hotel showed a net profit of \$1,084.86, compared with a net profit of \$17,007.51 for last year.

The Washington Hotel showed a net profit of \$2,464.99, as against a loss for 1916 of \$11,185.33. This is the first year in which the Washington Hotel has shown a profit on operations.

The appropriation for a new Tivoli Hotel failed to pass last Congress. It is believed that the future business of the canal should be looked after by having adequate hotels at both terminals. At the Atlantic end the Washington Hotel, though for two or three years little patronized, is now becoming of more service to the traveling public, and it is apparent that it will eventually be a paying investment. While the situation on the Pacific end is not quite so bad, in

that there are hotels of a certain class available in the city of Panama, it is nevertheless thought that shipping interests and tourists visiting the canal would be benefited if a new hotel were erected to take the place of the present Tivoli Hotel, which can be expected to last but a few years.

MOUNT HOPE PRINTING PLANT.

The value of stock on hand at the close of the fiscal year was \$81,767.72, as against \$53,407.02 for the preceding fiscal year, which increase was due almost entirely to the increased cost of material.

There were added to the equipment of the printing plant during the year one monotype caster, two automatic presses, one Embosograph machine with motor, one Miller saw trimmer with motor, and other small items to a total value of \$8,409.80; and unserviceable items to the value of \$174.76 were surveyed and disposed of, so that the total value of equipment on hand June 30, 1917, was \$46,132.61, as compared with \$37,897.57 for fiscal year ending June 30, 1916.

The following table shows the principal items of manufacture:

	Quantity.		Quantity.
Forms.....	26,475,565	Pads, desk.....	352
Books.....	140,654	Sheets, ruled.....	112,840
Sheets, carbon.....	18,700	Tags, assorted.....	1,571,900
Time-tables.....	29,075	Canal Records.....	565,400
Cards, guide, etc.....	428,926	Binders.....	3,088½
Stamps and daters.....	3,142	Programs.....	21,000
Cardboard.....	35,546	Rollers, press.....	30
Sheets, paper.....	721,560	Covers, leather.....	1,032
Badges.....	926	Monotype sorts, pounds....	463½
Pads, scratch.....	145,571		

The total value of material issued was \$87,482.47, as compared with \$78,115.24 for the preceding period. The total value of material used in manufacture was \$38,736.70, as compared with \$30,625.52 for the fiscal year ending June 30, 1916.

COMMISSARY OPERATIONS.

The commissary division has been in charge of Mr. R. K. Morris since August 1, 1916. This division operates the line commissaries, wholesale and manufacturing plants, the various plantations, hog, chicken, and dairy farms, etc. During the year the plan of eventually making the Canal Zone independent of outside sources for its food supply has been developed and arrangements have been perfected so that we would be able to support ourselves in case we should for any reason be cut off from all outside food supplies.

We now have 15 plantations and expect to raise all our coconuts, cacao, plantains, bananas, mangoes, grapefruit, limes, oranges, alligator pears, papayas, breadfruit, corn, yams, yampees, sweet potatoes, yucas, peanuts, melons, beans, tomatoes, okra, eggplant, lettuce, cucumbers, and other small vegetables. Some of these are now produced in sufficient quantities and others are being developed.

The following is quoted from the annual report of the general manager:

REPORT OF THE GENERAL MANAGER.

I submit herewith the following report and data with reference to the operations of the commissary division, for consideration in connection with the annual report for the fiscal year ended June 30, 1917.

The following statements are inclosed herewith:

First. Comparative statement of manufactured articles at the various plants, for the years 1915-16 and 1916-17. (Table No. 19.)

Second. List showing quantities of certain staple articles purchased during the fiscal year ending June 30, 1917, as compared with the previous year. (Table No. 20.)

Third. Statement of retail selling price as of July 1, 1917, as compared with prices in effect July 1, 1916. (Table No. 21.)

Fourth. Statement showing quantities of the more important articles purchased by the products buyer in Costa Rica, and the total value of all such purchases made during the year. (Table No. 22.)

In connection with statement No. 1 (Table No. 19), your attention is invited to the large increase in the output of the manufacturing plants. With the exception of the laundry and ice-cream plants, all branches of the manufacturing operations showed an increase, the largest increase being in the production of native beef. The value of this item increased from \$446,882.69 to \$927,551.06. The increase in the number of pounds of native beef consumed, as shown on statement No. 2 (Table No. 20), indicates that the consumption increased from 3,843,377 pounds in 1916 to 7,117,613 pounds in 1917, while a decided decrease is noted in the amount of fresh beef purchased in the United States, this item decreasing from 3,237,598 pounds in 1916 to 1,832,714 pounds in 1917.

There is a decrease in the amount of potatoes, onions, and cabbage used during the past year, due, no doubt, to the high cost of these vegetables, and an increase in the amount of yams, which would indicate that at least part of the American population is adopting native products.

Statement No. 3 (Table No. 21), comparison of retail selling prices as of July 1, 1917, and July 1, 1916: This shows a steady increase in prices of all food-stuffs during the current year.

Statement No. 4 (Table No. 22) shows the quantities of supplies purchased in Costa Rica.

Costa Rica purchases.—The Costa Rica agency was established early in 1916, and as the native production of that country had to be stimulated, there was very little fruit and vegetables purchased until the fall of 1916. The records indicate that during the last fiscal year a total of \$113,523.12 worth of supplies were purchased in Costa Rica, \$65,000 of which were coffee and sugar, the remaining amount being fruit and vegetables.

The shipments of fruit and vegetables from Costa Rica have been somewhat interrupted during the last two months on account of difficulties in transportation. Arrangements were recently made for a regular schedule to Port Limon by the Panaman steamship *San Blas*, and so long as this arrangement is in effect no more difficulty in transportation should be experienced.

During the past year the following new developments have been started in this department:

Sausage factory.—Machinery for a complete sausage-making plant was installed in the north end of the cold-storage plant, Cristobal. The plant has been in operation only for the latter half of the year, but is now turning out a sufficient quantity to take care of the entire local demand.

The products manufactured consists of bologna, frankfurters, liverwurst, minced ham, salami sausage, hamburger steak, smoked bacon, smoked ham, corned beef, and corned pork.

The total daily output of the above products amounts to about 3,000 pounds per day.

Ice-cream plant.—The new ice-cream plant has been in successful operation for the past eight months, and the manufacture of ice cream in brick form has become very popular with the trade. A large variety of flavors is available daily, whereas in the old plant it was not possible to send out more than two flavors in any one day.

Smokehouse.—A smokehouse was installed as part of the equipment of the sausage factory, and is being used for curing hams and bacon in addition to the

other products of the sausage factory. A very satisfactory grade of ham and bacon has been produced, and it has been determined beyond a doubt that this article can be successfully manufactured in large quantities as soon as the raw material is available, although it may be necessary to enlarge the plant in order to turn out sufficient to take care of the total demand.

Hog farm.—Several small shipments of live hogs were purchased in Colombia at the beginning of the year and brought to Cristobal by the *Caribbean*, which is operated by the cattle industry, along with their regular shipments of live cattle, and it was found that considerable economy was effected in purchasing the live hogs, as compared with the previous method of buying dressed pig carcasses from the United States. It was found that there is a considerable quantity of hogs available in Colombia, and in view of the steadily increasing price of pork products in the United States it was deemed advisable to go into this business on a larger scale. Accordingly a site was selected at a point on the Margarita road in the Mount Hope district, and arrangements made to receive shipments of both fat hogs and young shoats weekly.

The construction of feeding pens, farrowing pens, breeding pens, fencing, roads, and an office building was authorized, and all of this work is now practically completed.

There are now approximately 800 hogs on the farm, and this stock will be increased by weekly shipments until it has been brought up to a minimum of about 5,000. It is estimated that the stock will have to be maintained at this minimum figure to provide sufficient quantities of pork products to take care of the present consumption and do away with the necessity of importing any of these products from the United States.

Chicken farm.—Operations at the chicken farm at Mindi were begun about a year ago, at which time there was a stock of about 500 chickens and turkeys. With a view of continuing our efforts to establish a food supply independent of the markets in the United States, the stock has been increased during the year by weekly shipments from Colombia until it has now reached approximately 15,000 birds.

Shipments of chickens and turkeys are made from the farm daily to the abattoir at Cristobal, where they are dressed and shipped to the line commissaries on the following day to be placed on sale. Judging from the demand with which this fresh-killed poultry is meeting, the service is very much appreciated. There is a big demand for poultry on the Isthmus, but heretofore only cold-storage stock has been available.

Daily shipments of eggs are also made from the farm, and small quantities are being offered for sale in the retail stores.

Another farm is being prepared at New Culebra, and construction work on the buildings, etc., is now nearing completion. Arrangements have been made to stock this farm with pure-bred stock from the United States, and the first shipment is expected to arrive within the next few weeks. This action was considered advisable on account of the fact that the chickens available in the near-by markets have a very low vitality. By importing pure-bred stock it is hoped to raise the standard of the stock secured locally by crossbreeding.

Miscellaneous.—The following items of interest, in connection with the operations of the commissary division, are given for your information:

The chicken fattening house, located near the abattoir, has been converted into a hog and chicken slaughterhouse capable of handling 300 hogs and 2,000 chickens per day.

For the convenience of commissary patrons a laundry credit system has been put into effect, which enables employees to have their laundry delivered without first having to make payment for same.

The sale of ice cream by wagon has been inaugurated in the Balboa and Ancon districts.

Huckster wagons have been placed in operation at Colon beach, Balboa and Ancon, and Fort Grant.

Plans for a new cold-storage plant have been prepared and construction may be commenced as soon as approval is secured.

The new Ancon laundry, commenced last year, has been completed and put in service. This laundry handles all the work on the Isthmus, excepting that originating at Cristobal, Gatun, and the Army posts in this vicinity.

Work has been started on a silver commissary at Red Tank. This building will be completed in about 30 days. As soon as it is finished and placed in operation, Pedro Miguel commissary will be utilized to serve the gold trade in that district exclusively. On account of the increase in the colored population

in the Balboa district, it was found necessary to devote the Balboa commissary to the exclusive use of gold patrons. The silver trade in this district is being served by La Boca commissary and Ancon market. The service at these two points is still somewhat congested, but with the construction of additional quarters at Red Tank this situation will be somewhat relieved, as a number of the silver employees now working at Paraiso and Pedro Miguel live in Panama and will be moved to Red Tank and served by the commissary there.

Two supply boats have been constructed for supplying ships, one on each end of the canal.

A study has been made in regard to a fresh-fish supply, and the necessary equipment has been ordered. Experiments have also been made in salting native fish, and from such data now available it appears that a very desirable food supply can be obtained from this source.

A representative of the department was recently sent to South America to investigate the possibility of purchasing supplies on the west coast. Purchases amounting to \$31,581.52 were made. Under normal conditions there is apparently an abundant supply of peas and beans in these countries at reasonable prices, also great quantities of rice and fresh vegetables. Since the above-mentioned purchases were made most of the countries have prohibited the exportation of foodstuffs, and we can, therefore, secure no effective relief from this source under present conditions.

Plantations.—The following data and comments are submitted in connection with the plantation operations for the last fiscal year:

We have spent, and are now spending, a large amount of money in plantation developments. This expenditure is justified, and made necessary at this time on account of the high prices and scarcity of food supplies in the United States. It was also necessary to determine definitely whether or not food supplies could be grown successfully on the Isthmus. There are a number of features which tend to increase the cost of farming on the Isthmus. One of the greatest drawbacks is the inefficiency of West Indian labor. There is nothing more discouraging than to attempt to teach West Indian labor the use of labor-saving machinery. This class of labor also requires a large amount of supervision. This difficulty will be overcome wherever possible by having the work performed by Chinese. The principal item of expense is the high cost of clearing the land. It is no exaggeration to state that there are almost as many roots below the surface of the soil as there is jungle above it, which have to be grubbed out by hand before the land can be plowed and properly cultivated. The cost of this grubbing ranges from \$75 to \$150 per acre. It has to be done only once, however, and after the ground is once put in condition, it can then be cultivated economically for all time. That certain crops can be grown on the Isthmus has been demonstrated, and although the initial cost will be high and discouragements and failures many, the prospects of the plantations eventually becoming self-supporting commercially are good.

Up to the end of the last fiscal year, 12 plantations and farms had been turned over to the supply department, which were named and numbered as follows:

- | | | |
|----------------|-----------------|-------------------|
| 1. Pena Guapa. | 5. Sweetwater. | 9. Las Guacas. |
| 2. Emiliani. | 6. Bracho. | 10. Juan Mina. |
| 3. Manawa. | 7. Frijoles. | 11. Las Cascadas. |
| 4. Mindi. | 8. Davis Place. | 12. Venado. |

During the same year the following plantations have been started by the commissary division:

- | | | |
|---------------|------------|------------------|
| 13. Chilibre. | 14. Limon. | 15. New Culebra. |
|---------------|------------|------------------|

No. 1. Pena Guapa.—This place has been continued on the contract basis as outlined in previous report.

No. 2. Emiliani.—This grove is being operated by the department and is furnishing enough coconuts to justify its continuance.

No. 3. Manawa.—This place now contains approximately 15,000 cacao trees, 500 cocoanut trees, 50 acres of cane, and 200 breadfruit trees, besides a number of scattered mango, lime, and alligator pear trees. The cane has recently been planted for hog feed and for sale in the commissaries. There will be no further development of this place other than to supply additional cacao trees, which will be handled by the operating force. It is estimated that the number of cacao trees can be increased by about 30 per cent without clearing any more land.

No. 4. Mindi, and No. 6. Bracho.—The planting of additional papayas has been continued. It is hoped that in another year these places will supply the demand.

No. 5. Sweetwater.—The contract arrangement under which this place was being operated has been discontinued and the place is now being operated by the department direct. It is producing a sufficient number of nuts to justify its continuance.

No. 7. Frijoles, and No. 8. Davis Place.—Frijoles is being operated primarily to develop and bring into bearing an avocado orchard. It now contains 600 two-year old and 200 one-year to six-months' old avocado trees. In order to lessen the cost of maintenance and to derive some immediate revenue from the place, arrangements were made to have 25 Chinese gardeners cultivate about 20 acres of the land between the trees. One third of all the produce raised is taken by the commissary division for the use of the land, and the other two-thirds are purchased from the gardeners at current market prices. The gardeners started operations on January 16, 1917, and production by months since that time is as follows:

February	\$7.77
March	343.67
April	876.99
May	1,187.14
June	1,723.56

The remainder of the orchard, about 55 acres, has been planted in cowpeas. Since cultivation has been started between the trees, a great improvement in their condition has been noted.

No 9. Las Guacas.—This place is planted with 70 acres of bananas and plantains, 20 acres of Yucca, and 6 acres of sweet potatoes. There is now being planted 40 additional acres of sweet potatoes. A portion of this place has been planted in bananas for a number of years and on certain sections production has decreased to such an extent as to be no longer profitable. Such sections are being plowed and planted in other crops. A stable for eight head of stock has recently been erected at this place.

No. 10. Juan Mina.—This place is being developed primarily as a citrus grove. There are now 174 bearing seedling orange and lime trees and 2,341 budded orange, grapefruit, and lemon. Six hundred of the budded stock were planted in December, 1916, 1,350 in June, 1917, and the remainder in 1915. Some of the trees planted in 1915 are beginning to bear. Five acres have been planted in Mexican June corn and the remainder of the place with sweet potatoes between the rows of citrus trees. The entire place has been grubbed and plowed and will be kept under cultivation until the citrus trees are in full bearing. The sweet potato and corn crops will be followed by a crop of melons in the dry season. Arrangements are being made to start a nursery at this place and establish a local supply of high-grade budded stock. An irrigation system will be installed to furnish water during the dry season. A house for the foreman and a stable for eight animals have been constructed. A storehouse and laborers' barracks are now under construction.

No. 11. Las Cascadas.—This place is being operated as a cacao plantation exclusively. The yield last year was 42,648 pounds of cacao, which was sold for \$4,827.75 in New York. On account of the low price of cacao at present, its production is not profitable, as it is now selling for 11 cents per pound, whereas the normal price is from 16 to 25 cents per pound. It takes years to develop a cacao plantation, and although the place is now unprofitable, the only possible procedure is to continue cultivation with the hope that an increase in the price of cacao will occur after the war.

No. 12. Venado.—The cocoanut trees at this place have put out a satisfactory growth during the past year, and a few nuts will be harvested. Corn is being planted between the trees.

No. 13. Chilibre.—This is a new plantation, located in the Chilibre River Valley, consisting of 56 acres of very fertile land. It has been planted with 10 acres of sweet potatoes, 1 acre of dasheen, 39 acres of plantains, and 6 acres of yams.

No. 14. Limon.—This is also a new plantation, located at the junction of the Limon and Chagres Rivers, containing 247 acres of excellent land. In December, 1916, 150 acres were planted in bananas, which will come into bearing in November of this year. Fifteen acres have been planted in cane, and the re-

mainder of the place in sweet potatoes. A stable for eight head of stock, a house for the foreman, storehouse, and laborers' barracks have been constructed.

No. 15. New Culebra.—This place is located on the Panama Railroad main line, near the New Culebra station. There have been 100,000 hills of yams planted, and 50,000 pineapples, 25 acres of truck, and 25 acres of sweet potatoes are now being planted.

A truck farm was started in February, and has now a production of approximately \$1,000 per month. Tomatoes, okra, eggplant, and sweet peppers have been successfully raised. On one-eighth of an acre there was produced 1,600 pounds of snap beans, or at the rate of 12,800 pounds per acre. A small patch of corn was planted during the dry season and irrigated, a very satisfactory yield being secured, about 600 dozen roasting ears per acre. A shipping shed, located on the Panama Railroad, has been constructed, and a stable for 16 head of stock will be constructed in the near future.

There are several photographs accompanying this report, showing status and progress of work on the various plantations, the titles attached to each being self-explanatory.

DAIRY.

So much difficulty has been experienced in getting a regular supply of canned milk at reasonable prices that it was considered necessary to start a dairy farm, which will probably, ultimately, have at least 1,000 milch cows. This farm is near the railroad station at Mindi and the present plans call for a modern dairy for 350 milch cows.

SALES TO STEAMSHIPS.

The sales of commissary supplies to steamships using the canal and its terminal facilities increased from \$295,799.67 in 1916 to \$381,602.46, an increase of \$85,802.79. These sales will undoubtedly greatly increase when normal shipping is again resumed, as the ships appear to appreciate the opportunity of purchasing their supplies, especially groceries and cold storage articles, under governmental supervision.

CATTLE.

The work of clearing ground and making new pastures continued in charge of Capt. F. H. Smith, under whom was also placed the active supervision of everything in connection with the importation and pasturing of cattle. Mr. W. B. Brown continued as superintendent of the cattle industry, a large part of his time being spent in neighboring Central American countries in buying cattle. Dr. W. J. Taylor was made supervisor and veterinarian, and Mr. L. A. Byrnes was made general foreman over all camps and construction work.

This work, which began on a large scale in January, 1916, has continued, and on June 30, 1917, we had about 23,000 acres cleared, planted to grass and fenced, with the proper corrals and dips built. A part of this acreage is now finished pasture, but the greater portion will have to be again brushed, and some of it will require two brushings. Guinea grass is being planted on the high lands and para grass on the low lands. These two grasses are the standard for this section of the world.

During the year the *Caribbean* made 38 voyages to Colombia for the purpose of bringing in cattle. These voyages have brought to the Canal Zone 14,032 fat cattle, and 1,637 cattle varying from 1 to 3 years of age; also 34,547 chickens, 2,795 turkeys, 654 ducks, 884

hogs, and about 50 tons of yams, besides other produce. There have also been brought 101 cows out of a purchase of 1,000. These cows are to be used for dairy purposes.

The health of the cattle has been generally good. While the Isthmus is infected with the cattle tick, *Margoropus annulatus*, only a very few acute cases of southern cattle fever have developed, and those were in young animals. In order to materially reduce the infestation, concrete cattle dips have been provided at various convenient places, and it is hoped that in time the infestation may be practically eliminated. Located in connection with these dips permanent sorting corrals and treating chutes have been built which greatly facilitate the handling of cattle in large numbers and are economical and contribute to the comfort of the animals during the period of their round-up. Considerable difficulty is encountered with the parasite commonly known as the screw worm, as the least abrasion of the skin forms a focus for its development. Constant watching and treatment is therefore necessary.

Considerable progress can be reported as to the control of anthrax. Now that the infected areas are well defined, strict attention to management and vaccination of all animals ranging upon infected land has greatly reduced the losses. Vaccination is practiced only upon cattle which are kept upon infected territory, the Pasteur method of vaccination being employed. Suitable drainage has also been carried on. While an occasional loss of an animal from anthrax is to be expected, it is hoped that with further proper drainage and management anthrax will, during the coming year, be reduced to a minimum.

It is expected that we will have about 6,000 head of cattle on the pastures by December 1, 1917; by August, 1918, about 15,000; and by August, 1919, 20,000, a year's supply, which is the maximum number that present plans contemplate.

Respectfully submitted.

WM. R. GROVE,
Chief Quartermaster.

Col. CHESTER HARDING, *United States Army,*
Governor, The Panama Canal, Balboa Heights, Canal Zone.

TABLE No. 1.—*Force actually at work on June 27, 1917.*

Department or division.	Monthly.	Silver employees' wages, specified in United States currency.																Total.		Grand total.		
		Artisans.								Laborers.												
		Spe- cial.	22 cents.	20 cents.	19 cents.	18 cents.	16 cents.	16 cents.	15 cents.	14 cents.	13 cents.	12 cents.	10 cents.	9 cents.	8 cents.	7 cents.	5 cents.	Task.	Silver.		Gold.	
Operation and maintenance:																						
Dock construction.....	76	2	35		31			123		21								288	42	330		
Office.....	38	1						1										40	42	82		
Building division.....	144	1	435		594			402		308		197	11			3	2	2,100	342	2,442		
Electrical.....	76		28		47			87		97		79	10			1		425	168	593		
Municipal engineering.....	425		85		185	1		207		419		461	27			25	20	1,883	94	1,977		
Lock operation.....	491		14		16			15		12		59	8					615	128	743		
Dredging.....	1,487		9	1	34	2		57	1	143		25				2		1,761	272	2,033		
Mechanical.....	152	19	82		221			650		541		132	4			3	5	1,809	836	2,645		
Marine.....	286																	286	87	373		
Fortifications.....	147		42		52	3		48		345		44	6			2	6	980	60	1,040		
General construction.....	35				13			69	5	73		92	31			1	1	320	12	332		
Total.....	3,357	23	730	1	1,193	6		1,659	6	1,959		1,089	97			37	34	316	10,507	2,083	12,590	
Supply department:																						
Cattle industry—plan- tations.....	311		22		39			60		18		441	188			4	9	823	1,915	26	1,941	
Commissary.....	1,061		4		6	3		8		5		122	31						1,517	182	1,699	
Subsistence.....	349		2		2				7	1									354	21	375	
Quartermaster.....	806	19	95	1	71	12		83	2	130	1	549	67			4	4	23	1,867	103	1,970	
Accounting.....	15																		15	204	219	
Health.....	392		2		5			3		23		324	27			14		11	801	185	986	
Executive.....	125	1	1																127	397	524	
Panama Railroad.....	614		86	67	50	41		101	124	866	1,092	322	30			10	6	85	3,494	348	3,842	
Grand total.....	7,030	43	942	69	1,366	62		1,914	132	7	3,002	1,093	2,847	440	233	37	69	53	1,258	20,597	3,549	24,146

TABLE NO. 2.—*Force reports by months, fiscal year 1916-17.*
[Including contractors' force.]

Year and month.	The Panama Canal.		Panama R. R. Co.		Contractors' force.		Grand total.
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.	
1916.							
July.....	2,908	16,325	403	4,287	79	119	24,121
August.....	3,087	16,272	414	4,742	90	134	24,739
September.....	3,160	16,908	427	4,346	75	106	25,022
October.....	3,367	18,097	428	3,520	63	83	25,558
November.....	3,425	18,281	430	3,628	22	48	25,834
December.....	3,558	18,407	409	3,320	22	48	25,764
1917.							
January.....	3,552	17,989	401	4,052	22	48	26,064
February.....	3,382	18,404	414	3,561	.....	.....	25,761
March.....	3,405	18,560	395	3,175	.....	.....	25,535
April.....	3,382	18,403	369	2,590	.....	.....	24,744
May.....	3,273	17,178	344	3,468	.....	.....	24,263
June.....	3,201	17,103	348	3,494	.....	.....	24,146

TABLE NO. 3.—*High and low force records, December, 1906, to June 30, 1917, by fiscal years.*

	The Panama Canal.			Panama R. R.	Total Panama Canal and Panama R. R.
	Gold.	Silver.	Total.	Gold and silver.	
1906.					
December	3, 881	15, 604	19, 485	4, 416	23, 901
1907.					
October	4, 992	20, 836	25, 828	6, 139	31, 967
January	4, 033	16, 987	21, 020	4, 796	25, 816
1908.					
April	4, 950	21, 168	26, 118	7, 052	33, 170
November	4, 161	19, 803	23, 964	5, 863	29, 827
1909.					
October	4, 376	23, 411	27, 787	7, 618	35, 495
January	4, 295	20, 583	24, 878	6, 393	31, 271
1910.					
March	4, 553	26, 284	30, 837	7, 829	38, 676
December	4, 705	24, 383	29, 098	6, 044	35, 142
1911.					
December	4, 420	25, 439	29, 859	7, 967	37, 826
June	4, 292	21, 795	26, 087	6, 603	32, 690
1912.					
January	4, 332	25, 818	30, 150	8, 024	38, 174
August	4, 122	24, 860	28, 982	5, 855	34, 837
1913.					
August	4, 087	30, 918	35, 005	4, 957	39, 962
December	3, 744	23, 209	26, 953	5, 195	32, 148
1914.					
January	3, 944	23, 824	27, 768	5, 502	33, 270
June	3, 790	21, 499	25, 289	4, 343	29, 632
1915.					
July	4, 198	22, 846	27, 044	5, 314	32, 358
February	3, 088	17, 023	20, 111	2, 978	23, 089
1916.					
July	3, 208	17, 982	21, 190	5, 349	26, 539
September	3, 129	17, 160	20, 289	2, 447	22, 736
1917.					
January	3, 552	17, 989	21, 541	4, 453	25, 994
June	3, 229	16, 381	19, 610	3, 368	22, 978

NOTE.—Figures do not include contractors' forces. If taken into consideration, the greatest working force ever reported was 44,733 on Mar. 26, 1913.

TABLE NO. 4.—*Occupants of Panama Canal and Panama Railroad quarters June 30, 1917.*

Place.	Gold.			Europeans.			West Indians.		
	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
Balboa ¹	1, 149	689	886	127	8	8	1, 196	535	778
Ancon.....	810	475	460	.....	.....	.....	203	14	2
Corozal.....	19	13	6	.....	.....	.....	57	15	2
Pedro Miguel ²	286	178	164	3	3	8	³ 562	346	486
Paraiso.....	181	81	97	34	4	14	526	111	187
Culebra ⁴	21	15	12	.....	.....	.....	⁵ 200	128	214
Gamboa ⁶	30	8	8	2	1	1	⁷ 172	62	82
Gatun.....	222	174	197	22	2	5	839	459	502
Cristobal ⁸	946	303	399	86	.....	.....	⁹ 2, 524	286	637
Total.....	3, 664	1, 936	2, 229	274	18	36	6, 279	1, 956	2, 890

¹ Includes Naos Island and Palo Seco.² Includes Miraflores and Red Tank.³ Includes 26 Panamans.⁴ Includes Empire and Las Cascadas.⁵ Includes 11 Panamans.⁶ Includes New Culebra and Gold Hill.⁷ Includes 11 Panamans.⁸ Includes Colon Beach and Colon Hospital.⁹ Includes 15 East Indians, 15 colored American citizens, and 360 Panamans.TABLE NO. 5.—*Applications for married quarters on file June 30, 1917.*

Ancon.....	131	(8)
Ancon Hospital.....	3	
Paraiso.....	71	(2)
Gatun.....	66	(15)
Cristobal.....	207	(83)
Total.....	478	(108)

NOTE.—The figures in parentheses show the number of applicants already occupying regular or non-housekeeping family quarters at stations other than those at which applications are filed.

TABLE NO. 6.—*Animals in corrals June 30, 1917.*

Stations.	American horses.	Native ponies.	Mules.	Police ponies.	Private animals.	Total.
Ancon-Balboa.....	16	5	135	11	17	184
Paraiso-Pedro Miguel.....	6	3	34	5	3	51
Gatun.....	.....	1	23	3	.....	27
Cristobal.....	14	1	106	.....	.....	121
Total.....	36	10	298	19	20	383

TABLE No. 7.—Value of material received during the fiscal year 1916-17 on requisition.

	1916										1917									
	July.	August.	Septem-ber.	October.	Novem-ber.	Decem-ber.	January.	Febru-ary.	March.	April.	May.	June.	Total.							
Construction, operation, and maintenance:																				
Lock operation and maintenance:																				
Terminal construction.....	\$3,931.85	\$2,013.25	\$17,792.71	\$1,522.26	\$9,860.95	\$7,321.19	\$415.25	\$2,319.91	\$1,484.43	\$2,163.23	\$3,984.64	\$2,197.62	\$55,017.25							
Electrical division.....	45,431.46	86,880.01	59,295.53	76,968.63	59,968.89	455.50	86,279.52	103,955.45	61,287.15	8,501.10	930.13	202.50	618,195.97							
Dredging division.....	2,826.41	39,012.32	56,287.79	89,277.30	85,723.63	42,694.27	24,231.63	52,815.61	46,589.61	73,472.93	86,982.59	100,593.58	665,535.03							
Mechanical division.....	22,847.33	39,244.43	42,053.00	23,625.79	41,789.69	38,546.27	19,340.94	15,391.38	20,626.40	19,437.23	24,019.71	3,420.21	310,342.38							
Building division.....	1,374.01	4,581.64	9,740.35	14,640.89	50,639.19	38,541.26	26,948.31	11,259.66	15,308.38	6,265.52	13,817.38	14,867.00	208,383.59							
Municipal engineering division.....	16,407.68	21,893.92	9,220.72	23,865.39	98,905.07	58,579.65	66,343.26	116,344.15	116,942.49	63,404.99	87,146.17	63,624.38	969,598.89							
Fortifications.....	1,842.19	9,867.60	38,226.05	6,104.18	9,867.07	26,041.33	2,962.54	4,052.54	11,093.82	2,572.32	11,093.82	9,254.11	157,181.62							
Accounting department.....	3,645.33	2,123.92	2,612.36	6,104.18	2,749.78	7,262.08	567.70	7,958.64	859.14	4,559.90	19,646.18	22,499.70	80,594.91							
Executive secretary.....	5,090.31	2,541.00	3,975.28	3,896.20	4,812.27	3,615.32	3,566.53	4,064.61	1,973.00	1,400.72	1,058.17	3,721.12	37,179.91							
Meteorology and hydrography.....	36.74	292.88	116.56	2,236.84	71.00	.....	.....	.....	.....	.....	.....	.....	2,686.02							
Commissary division.....	2,324.90	2,770.40	1,058.50	1,560.14	820.70	4,963.08	112,011.13	2,628.41	1,939.56	8,355.18	3,696.83	1,308.79	143,437.62							
Marine division.....	104.86	10,783.92	5,417.42	166.00	2,781.16	13,886.42	9.80	200.00	2,487.90	10.27	6,132.50	552.50	42,532.75							
Supply department (stock).....	440,881.67	551,629.90	705,423.80	774,327.97	1,006,357.17	609,536.29	571,494.43	509,173.80	425,501.11	520,184.33	595,173.19	477,884.11	7,187,573.79							
Total.....	568,823.49	767,852.22	1,068,220.12	1,126,932.02	1,370,371.99	891,317.44	914,236.74	832,190.00	705,745.02	709,134.33	853,561.45	700,125.62	10,508,511.10							
Health department.....	7,825.77	4,773.65	7,617.74	11,347.76	22,151.71	15,300.60	13,872.65	9,871.08	8,986.07	5,189.10	20,248.80	13,311.86	140,496.79							
Civil Government.....	93.18	1,459.73	6,670.40	1,163.66	1,244.57	5,012.64	1,094.62	492.89	607.64	567.45	1,320.15	295.87	20,052.30							
Panama Railroad Company.....	18,570.29	6,123.33	2,001.01	1,044.50	31,042.20	11,806.87	14,406.45	18,115.20	517.36	7,206.74	20,296.04	6,826.33	148,046.32							
Grand total.....	595,312.73	780,238.93	1,084,509.27	1,140,488.54	1,424,810.47	923,437.55	943,699.96	860,660.23	715,856.09	722,092.90	853,561.45	720,559.68	10,817,106.51							
Local purchases on the Isthmus:																				
Coal purchased from Panama Railroad Company.....	34,223.50	36,848.46	29,330.70	31,323.76	26,947.40	38,093.58	38,811.44	36,949.30	37,053.19	32,343.58	35,050.63	33,709.65	410,685.19							
Miscellaneous purchases from Panama Railroad Company.....	4,538.92	6,901.68	4,569.05	8,157.26	6,742.16	5,876.87	5,614.72	7,678.44	11,566.55	12,669.60	15,703.49	10,073.75	100,092.79							
Subsistence supplies purchased from Panama Railroad commissaries:																				
Hotels.....	40,201.87	39,857.01	59,619.61	42,668.72	43,035.37	46,622.31	45,645.65	40,621.95	46,971.68	42,986.72	42,951.37	42,069.81	513,252.07							
Tivoli.....	6,221.23	6,291.82	5,483.26	5,997.17	6,841.44	7,911.37	7,475.19	7,194.11	7,156.13	7,103.56	6,739.30	6,526.93	80,885.11							
Dredging division.....	20,168.68	19,107.80	16,480.17	16,612.78	17,123.01	18,632.49	17,750.95	17,750.95	20,132.62	13,799.88	19,988.78	18,988.78	216,734.75							
Health department.....	10,384.16	10,415.68	10,584.36	9,996.29	11,377.93	12,934.85	12,507.46	12,218.01	19,363.62	12,713.53	13,336.13	14,915.95	144,357.37							
Miscellaneous purchases from local merchants.....	1,958.58	511.60	562.64	790.65	608.48	761.21	554.90	984.75	1,796.45	3,204.10	664.22	1,198.07	13,574.74							
Postage stamps.....	130.00	40.00	40.00	.....	.....	20.00	.....	.....	.....	.....	.....	.....	310.00							
Ice.....	3,180.16	3,484.92	2,941.44	3,234.29	2,991.32	3,128.09	3,101.94	3,030.12	3,224.48	2,820.93	3,299.56	3,146.72	37,352.97							
Total local purchases on the Isthmus.....	121,016.10	123,418.97	109,611.23	118,890.52	115,690.11	133,980.77	130,949.82	124,397.63	141,524.32	129,141.90	137,753.76	130,339.66	1,516,914.79							

TABLE No. 8.—*Statement showing sales of material, supplies, and equipment heretofore purchased or acquired for the construction of The Panama Canal, made by authority of the Governor without advertisement and on which time did not permit securing approval of the Secretary of War, required by Executive order of May 12, 1915, fiscal year 1917.*

Sale No.	Name of purchaser.	Article sold.	Sale value.
OS-289	Capt. W. Lambert.	{Lathe, turret, E-19.	\$150.00
OS-292	F. Boyd.	{Drill, press, No. 212.	150.00
OS-303	Rafael, Cuevas F.	6,700# channels, T-head.	100.50
OS-304	A. Levingston.	Boiler, B-50, 33 h. p.	155.00
OS-309	A. Papio.	{Condenser, Worthington, w/7½ by 10½ by 10 inches	550.00
CS-396	Chile Exploration Co.	{horizontal air pump No. 183080.	
CS-464	W. Moffitt.	{Condenser, Worthington w/o pump.	450.00
CS-501	J. M. Hyatt.	7 NT scrap iron.	140.00
CS-668	Chile Exploration Co.	2 engines, boom, 9 by 9 inches, for 95-ton steam shovel.	390.00
CS-683	A. Levingston.	Drill, press, radial, OFS, No. P-8.	150.00
CS-684	do.	Locomotive, Decauville, No. 05.	100.00
CS-797	do.	4 swing circles, 8 feet by 8 feet by 1 foot 6 inches for 95-ton steam shovel.	600.00
CS-837	J. F. Lindsay	{Compressor, air, 1,000 cubic feet BM 11.	450.00
CS-876	A. Levingston.	3 pumps, simplex, Worthington, 12 by 20 by 24 inches	399.99
CS-883	do.	2 pumps, duplex, Knowles, 10 by 14 by 12 inches.	266.66
CS-907	Pinel Hemanos.	3 condensers.	300.00
CS-929	A. Levingston.	Lot air compressor parts (approximately 10 tons).	200.00
CS-938	Chile Exploration Co.	216,200# scrap angles, channels, and plates.	3,243.00
CS-941	A. Levingston.	Engine, Clapet.	200.00
CS-987	do.	do.	250.00
CS-161	Capt. W. Lambert.	Boiler, Clapet.	100.00
5097	United Fruit Co.	Compressor, Rand, type 10, LC-24.	1,000.00
CS-673	A. Levingston.	Compressor, Rand, type 10, LC-25.	1,000.00
		Engine, Clapet.	200.00
		Lathe, Bal-20, OFS.	100.00
		Lot chucks.	100.00
		Track shifter, No. 2.	500.00
		Car, steel, flat, No. 494.	600.00
		Engines, pumping, Nos. 2294, 2296, and 2297 w/misc. fittings.	10,000.00
		Compressor, air, Rand, type 10, RG-24, ICC-1.	1,000.00
		1,612.0# copper tubing.	500.00
		51,800# rail scrap 70#.	346.88
		5 filters, pressure.	1,750.00
		Machine, clamp flanging BM-301.	100.00

TABLE No. 9.—*Houses, apartments, and occupants, by district, of gold and silver quarters, as of June 30, 1917.*

Districts.	Gold.		Silver.		Total.	
	Family.	Bachelor.	Family.	Bachelor.	Family.	Bachelor.
Ancon-Balboa:						
Houses occupied.	444	47	54	34	498	81
Rooms or apartments.	1,006	717	420	146	1,426	863
Number of occupants.	3,411	1,048	1,727	1,146	5,138	2,194
Corozal:						
Houses occupied.	7	4		2	7	6
Rooms or apartments.	9	14		16	9	30
Number of occupants.	24	14		79	24	93
Paraiso-Pedro Miguel:						
Houses occupied.	137	15	65	11	202	26
Rooms or apartments.	242	174	421	88	663	262
Number of occupants.	767	220	1,568	694	2,335	914
Gamboa:						
Houses occupied.	6	4	12	4	18	8
Rooms or apartments.	8	10	58	54	66	64
Number of occupants.	24	22	207	113	231	135
Gatun:						
Houses occupied.	57	6	55	10	112	16
Rooms or apartments.	168	29	461	98	629	127
Number of occupants.	533	60	1,429	400	1,962	460
Cristobal:						
Houses occupied.	113	31	56	28	169	59
Rooms or apartments.	296	376	270	55	566	431
Number of occupants.	1,001	647	1,193	2,340	2,194	2,987
Total:						
Houses occupied.	764	107	242	89	1,006	196
Rooms or apartments.	1,729	1,320	1,630	457	3,359	1,777
Number of occupants.	5,760	2,011	6,124	4,772	11,884	6,783

NOTE.—The above does not include 13 and 135 apartments at Culebra, Empire, and Las Cascadas, accommodating 13 gold families and 116 silver families, respectively.

TABLE NO. 10.—*Operation of Hotel Tivoli July 1, 1916, to June 30, 1917.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operation.	Revenue.	Profit.	Loss.	Meals served.
1916.								
July.....	\$6,008.12	\$2,563.32	\$2,630.10	\$11,201.54	\$9,988.09	.....	\$1,213.45	7,522
August.....	5,775.78	2,751.47	2,640.38	11,167.63	9,463.50	.....	1,704.13	7,205
September.....	5,382.15	2,742.23	2,151.91	10,276.29	9,528.10	.....	748.19	7,574
October.....	6,162.99	2,761.73	3,215.46	12,140.18	10,366.05	.....	1,774.13	8,113
November.....	6,754.40	2,804.01	2,464.94	12,023.35	11,772.18	.....	251.17	9,165
December.....	7,288.72	3,021.75	3,430.69	13,741.16	14,064.87	\$323.71	.....	11,087
1917.								
January.....	7,870.72	3,236.18	3,178.76	14,285.66	15,685.85	1,400.19	.....	11,211
February.....	7,112.61	3,264.14	3,351.27	13,728.02	17,638.95	3,910.93	.....	12,219
March.....	6,979.37	3,135.53	3,586.35	13,701.25	14,266.75	565.50	.....	10,828
April.....	7,030.20	2,902.59	3,081.40	13,014.19	15,242.40	2,228.21	.....	12,155
May.....	6,366.87	2,795.95	3,410.36	12,573.18	13,243.90	670.72	.....	10,920
June.....	5,917.06	2,639.38	2,987.95	11,544.39	11,463.85	.....	80.54	9,174
Total.....	78,648.99	34,618.28	36,129.57	149,396.84	152,724.49	9,099.26 ¹	5,771.61	117,173

¹ Net profit, \$3,327.65.TABLE NO. 11.—*Summary of operations of line hotels July 1, 1916, to June 30, 1917.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operation.	Revenue.	Profit.	Loss.
1916.							
July.....	\$31,176.38	\$5,162.82	\$2,477.58	\$38,816.78	\$39,401.67	\$584.89	.....
August.....	30,707.17	5,032.31	2,671.08	38,410.56	39,073.78	663.22	.....
September.....	29,320.75	4,908.15	2,702.33	36,931.23	38,160.04	1,228.81	.....
October.....	32,371.92	4,903.57	2,538.29	39,813.78	39,981.86	168.08	.....
November.....	31,842.46	5,057.41	2,365.39	39,265.26	40,228.51	963.25	.....
December.....	34,905.50	5,176.00	3,484.17	43,565.67	41,997.96	.....	\$1,567.71
1917.							
January.....	34,597.47	5,885.35	3,507.99	43,990.81	43,480.80	.....	510.01
February.....	31,775.95	6,087.98	3,529.47	41,393.40	41,184.53	.....	208.87
March.....	36,102.83	6,509.44	3,620.48	46,232.75	46,148.56	.....	84.19
April.....	33,174.51	6,492.48	4,102.98	43,769.97	43,407.04	.....	362.93
May.....	32,960.15	6,370.51	3,369.36	42,700.02	41,095.31	.....	1,604.71
June.....	30,700.91	6,235.86	3,571.80	40,508.57	38,139.53	.....	2,369.04
Total.....	389,636.00	67,821.88	37,940.92	495,398.80	492,299.59	3,608.25	6,707.46

Loss..... \$3,099.21
 Charges against line hotels for fuel, light, repairs to buildings, etc..... 15,973.86

Profit on messes (see Table No. 12)..... 19,073.07
 10,016.47

Net loss on laborers' messes and line hotels if charges for fuel, light, repairs to buildings, etc., had been made..... 9,056.60

TABLE NO. 12.—*Summary of operations, laborers' messes, July 1, 1916, to June 30, 1917.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operations.	Revenue.	Profit.	Loss.	Rations served.
1916.								
July.....	\$9,049.42	\$891.54	\$552.97	\$10,493.93	\$12,794.76	\$2,300.83	.....	36,894
August.....	9,418.91	919.47	676.88	11,015.26	13,036.56	2,021.30	.....	39,049
September.....	8,150.85	927.94	784.26	9,863.05	11,308.67	1,445.62	.....	33,974
October.....	10,818.81	1,006.47	1,007.60	12,832.88	14,503.69	1,670.81	.....	36,702
November.....	10,778.44	1,055.83	811.67	12,645.94	13,878.78	1,232.84	.....	37,359
December.....	11,059.06	994.68	1,034.76	13,088.50	12,519.92	.....	\$568.58	33,853
1917.								
January.....	10,831.43	1,103.38	736.68	12,671.49	12,403.18	.....	268.31	33,913
February.....	8,736.66	1,080.45	694.15	10,511.26	10,964.79	453.53	.....	32,461
March.....	9,202.22	984.37	626.55	10,813.14	11,089.14	276.00	.....	32,874
April.....	8,798.31	984.18	672.52	10,455.01	10,776.68	321.67	.....	32,519
May.....	10,522.40	982.63	717.00	12,222.03	12,513.00	290.97	.....	37,676
June.....	10,593.79	1,001.64	543.61	12,139.04	12,978.83	839.79	.....	41,506
Total.....	117,960.30	11,932.58	8,858.65	138,751.53	148,768.00	10,853.36	836.89	428,785

TABLE NO. 13.—*Sales.*

	General storehouse.	Cristobal.	Paraiso.	Total.
Number of local sales.....	10,811	3,872	2,780	17,463
Number of sales to steamships.....	722	926	-----	1,648
Number of credit sales.....	3,399	474	10	3,883
Total.....	14,932	5,272	2,790	22,994
Value of local sales.....	\$57,937.31	\$34,002.00	\$3,775.18	\$95,714.49
Value of sales to steamships.....	158,787.82	92,885.81	-----	251,673.63
Value of credit sales.....	203,781.88	42,394.51	58.49	246,234.88
Total.....	420,507.01	169,282.32	3,833.67	593,623.00

TABLE NO. 14.—*Material on hand at end of year and total of all issues.*

[Exclusive of obsolete material and scrap.]

	General storehouse.	Cristobal storehouse.	Paraiso storehouse.	Total.
On hand, 1916.....	\$3,083,123.30	\$356,221.92	\$759,047.12	\$4,198,392.34
On hand, 1917.....	-----	-----	-----	-----
Issued, 1915-16.....	7,194,241.19	811,364.49	1,022,958.39	9,028,564.07
Issued, 1916-17.....	-----	-----	-----	-----

TABLE NO. 15.—*Fuel oil handled.*

	Balboa.	Mount Hope.	Total.
Number of barrels received by The Panama Canal.....	673,274	228,160	901,434
Number of barrels used by The Panama Canal.....	483,793	65,012	548,805
Number of barrels pumped for individuals and companies.....	1,369,999	80,139	1,440,138
Number of barrels sold by The Panama Canal.....	52,000	32,849	84,846
Total number of barrels handled.....	2,569,066	406,160	2,975,223
Total number of ships handled.....	347	59	406

TABLE NO. 16.—*Fuel-oil storage facilities.*

Owned by.	Number of tanks.	Capacity in barrels, each.	Total capacity.
At Balboa:			
The Panama Canal.....	2	42,000	84,000
The Panama Canal (1 leased from Panal Canal Storage Corporation).....	2	55,000	110,000
The Panama Canal.....	1	5,000	5,000
The Panama Canal Storage Corporation ¹	1	55,000	55,000
The Union Oil Co. of California.....	4	35,000	140,000
The Panama Agencies Co.....	1	25,000	25,000
The West India Oil Co.....	1	25,000	25,000
The West India Oil Co.....	1	65,000	65,000
At Mount Hope:			
The Panama Canal.....	2	42,000	84,000
The Panama Canal (1 leased from Panama Canal Storage Corporation).....	2	55,000	110,000
The Panama Canal.....	1	5,000	5,000
The Panama Canal Storage Corporation ¹	1	55,000	55,000
The Huasteca Petroleum Co.....	2	55,000	110,000
The Texas Oil Co.....	2	55,000	110,000
The Union Oil Co. of California (not connected to our manifold).....	3	35,000	105,000
Total.....	26	-----	1,088,000

¹ In addition to the one leased to The Panama Canal.

TABLE No. 17.—*American scrap operations.*

	Net tons.	Value. ¹
On hand July 1, 1916.....	32,784	\$131,136
Received during fiscal year.....	15,008	60,032
	47,792	191,168
Issued to canal divisions, 700 tons; shipped to United States, 34,967 tons.....	35,067	140,268
On hand June 30, 1917.....	12,725	50,900

¹ Value at \$4 net ton.TABLE No. 18.—*Obsolete and surplus material.*

[Appraised value.]

	Amount.	Total amount.
On hand July 1, 1916.....	\$665,396.40	\$972,538.48
Received during fiscal year 1917.....	307,142.08	
Shipped to United States.....	71,267.07	
Local sales.....	239,387.33	533,808.47
Issued and transferred to canal divisions.....	212,659.71	
Surveyed and scrapped.....	10,494.36	
Balance on hand June 30, 1917.....		438,730.01

TABLE No. 19.—*Comparative statement of output of manufacturing plants, commissary division, fiscal years 1915-16 and 1916-17.*

	1915-16	1916-17
Laundry (Cristobal):		
Total number pieces handled.....	3,970,674	3,649,814
Value of output.....	\$94,719.68	\$91,722.87
Laundry (Ancon):		
Total number pieces handled.....	4,509,308	4,094,273
Value of output.....	\$98,242.83	\$93,262.51
Bakery:		
Total output of bread, loaves.....	6,385,981	7,211,417
Total output of rolls, each.....	1,093,792	1,129,400
Total output of cake, pounds.....	140,477	132,493
Total output of doughnuts, packages.....	50,982	51,840
Total output of pies, each.....	19,019	28,559
Value of output.....	\$297,439.63	\$365,962.92
Coffee roasting:		
Roasted coffee produced, pounds.....	381,650	427,921
Value of output.....	\$83,535.69	\$94,023.30
Ice manufacturing:		
Ice manufactured, tons.....	39,461	45,044
Value of output.....	\$230,834.69	\$263,507.40
Ice-cream plant:		
Ice cream manufactured, gallons.....	167,528	163,326
Milk bottled, quarts.....		386,164
Cream bottled, quarts.....		23,402
Value of output.....	\$251,880.93	\$226,024.22
Sausage factory:		
Corned beef produced, pounds.....	196,169	188,271
Hamburger steak produced, pounds.....	125,712	135,677
Homemade sausage produced, pounds.....	8,553	37,718
Corned pork produced, pounds.....	2,932	12,027
Tongue produced, pounds.....	5,450	12,913
Value of output.....	\$54,960.67	\$55,525.14
Industrial laboratory: Value of product.....	\$116,176.40	\$179,363.56
Abattoir:		
Cattle killed.....	7,762	13,180
Dressed beef produced, pounds.....	3,845,377	7,118,803
Value of output.....	\$446,882.69	\$927,551.06

TABLE NO. 20.—Statement showing quantities of certain staple articles imported during the fiscal year ending June 30, 1917, as compared with the previous year.

	1916	1917
Groceries:	<i>Pounds.</i>	<i>Pounds.</i>
Sugar.....	4,938,161	5,448,538
Preserved fruits in sirup, in tins and glass.....	753,006	571,673
Milk, evaporated and condensed.....	3,090,044	4,325,136
Tomatoes, in tins.....	1,121,472	1,105,648
Flour.....	7,137,214	8,118,193
Rice.....	1,440,518	2,239,304
Fish, canned.....	404,066	377,498
Coffee.....	458,740	689,071
Beef, native.....	3,843,377	7,117,613
Fresh meats.....	3,237,598	1,832,714
Cured and pickled meats.....	1,023,485	923,206
Butter, fresh.....	500,563	430,702
Milk, fresh.....	<i>Gallons.</i> 148,250	<i>Gallons.</i> 145,800
Eggs.....	<i>Dozen.</i> 759,414	<i>Dozen.</i> 753,874
Fresh vegetables:	<i>Pounds.</i>	<i>Pounds.</i>
Potatoes, white.....	8,465,704	7,742,630
Onions.....	1,336,716	1,062,012
Cabbage.....	1,095,768	803,540
Yams.....	584,687	653,833
Fresh fruits:		
Apples.....	<i>Dozen.</i> 1,041,939	<i>Dozen.</i> 970,068
Oranges.....	<i>Dozen.</i> 194,340	<i>Dozen.</i> 189,155
Grapefruit.....	<i>Number.</i> 273,168	<i>Number.</i> 216,535

TABLE NO. 21.—Statement of comparative selling prices for June 30, 1917, as against June 30, 1916.

	Unit.	Prices.	
		1916	1917
Fresh meats:			
Beef, stew (native).....	Pound.....	\$0.06	\$0.07
Beef, chuck roast, 3 pounds and over (native).....	do.....	.08	.10
Beef, rib roast, first cut, not under 3 pounds (native).....	do.....	.11	.15
Beef, rump roast (special).....	do.....	.25	.29
Beef, rump roast (native).....	do.....	.12	.15
Beefsteak, sirloin (special).....	do.....	.25	.30
Beefsteak, sirloin (native).....	do.....	.12	.15
Mutton, loin chops or roast.....	do.....	.29	.38
Pork, hams, fresh.....	do.....	.30	.25
Pork, loin chops or roast.....	do.....	.23	.32
Veal, loin chops or roast.....	do.....	.36	.42
Cured and pickled meats:			
Bacon, breakfast, whole piece.....	do.....	.31	.43
Ham, sugar cured, whole.....	do.....	.26	.34
Poultry and game: Chickens, corn fed.....	do.....	.34	.43
Dairy products:			
Butter, creamery (special).....	do.....	.42	.49
Eggs, fresh.....	Dozen.....	.37	.46
Fish:			
Codfish, dried.....	Pound.....	.11	.11
Fish, fresh (native).....	do.....	.11	.11
Vegetables:			
Onions.....	do.....	.04	.06
Potatoes, white.....	do.....	.035	.08
Fruits, fresh: Apples.....	do.....	.045	.06
Groceries:			
Beans, Navy, dried.....	do.....	.08	.13
Coffee, ground, No. 1.....	do.....	.20	.20
Corn, sugar.....	Tins, 24.....	.10	.14
Flour.....	Pound.....	.03	.055
Lard, compound.....	do.....	.13	.17
Milk, evaporated.....	Tins, 14.....	.08	.14
Peas, extra sifted.....	Tins, 24.....	.12	.15
Rice, second grade.....	Pound.....	.04	.05
Soap, laundry.....	Cake.....	.05	.05
Sugar, granulated.....	Sack, 55.....	.37	.39
Tomatoes.....	Tins, 3s.....	.13	.16

TABLE No. 22.—*Statement of the more important articles purchased by the products' buyer in Costa Rica during period from July 1, 1916, to June 30, 1917.*

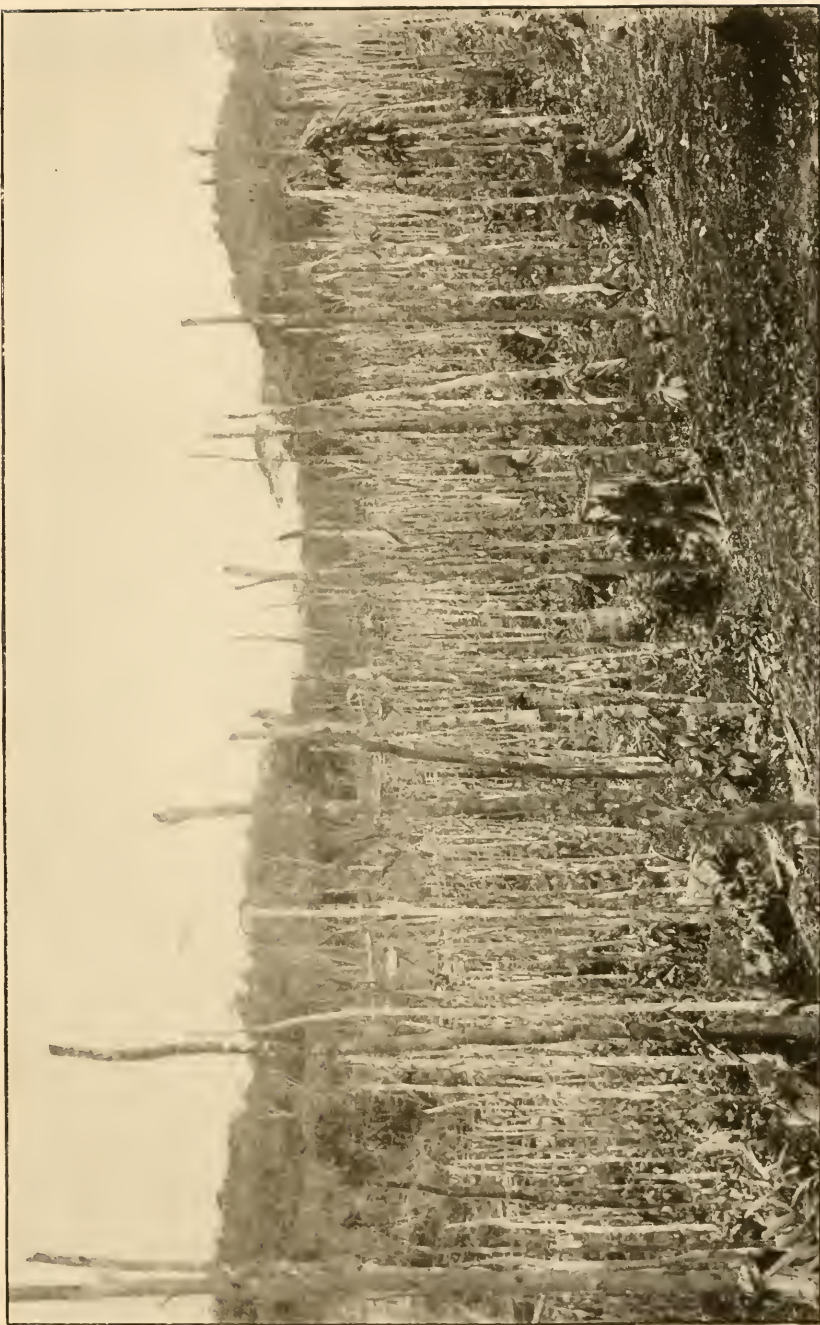
Commodity.	Quantity.	Commodity.	Quantity.
Beans, string.....pounds..	25,103	Oranges.....number..	1,789,765
Beets.....do.....	57,557	Potatoes, white.....pounds..	1,072,750
Cabbage.....do.....	131,263	Potatoes, sweet.....do.....	153,157
Carrots.....do.....	115,558	Squash.....do.....	20,139
Grapefruit.....number..	189,798	Tomatoes.....do.....	58,387
Lettuce.....pounds..	88,755	Turnips.....do.....	101,567

NOTE.—In addition to the above, moderate quantities of other fruits and vegetables in season were supplied, such as green corn, peppers, parsley, strawberries, green peas, eggplant, bananas, plantains, cucumbers, etc.

TOTAL VALUE OF ALL PURCHASES MADE IN COSTA RICA DURING THE PERIOD
FROM JULY 1, 1916, TO JUNE 30, 1917.

Commodity.	Value.
Fruits and vegetables.....	\$47,593.42
Coffee.....	16,608.96
Sugar.....	49,320.74
Total.....	113,523.12

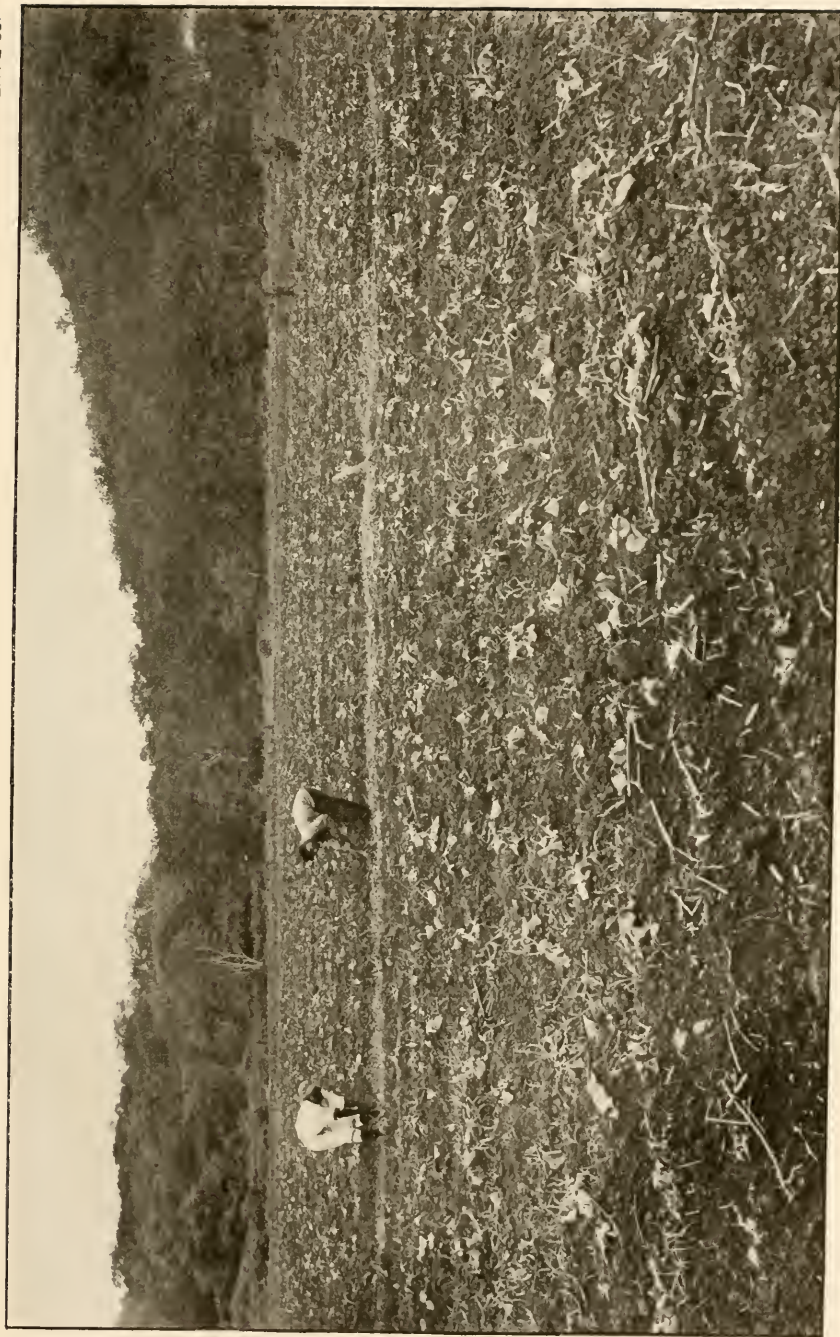
NOTE.—The above quantity of coffee was received during the period from March to June, 1917, only, and the sugar from January to June, 1917, only.



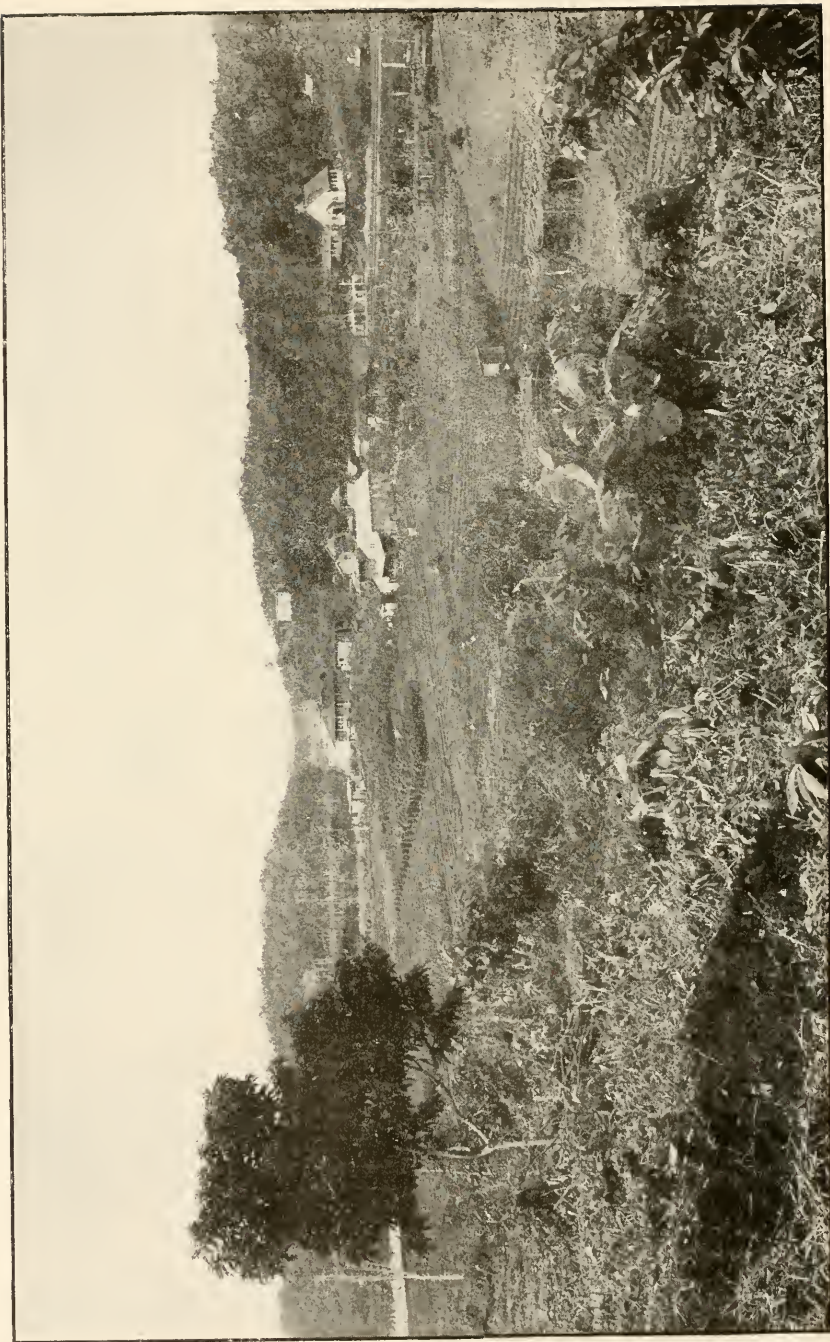
YAM FIELD. CHILIBRE PLANTATION. JUNE, 1917.



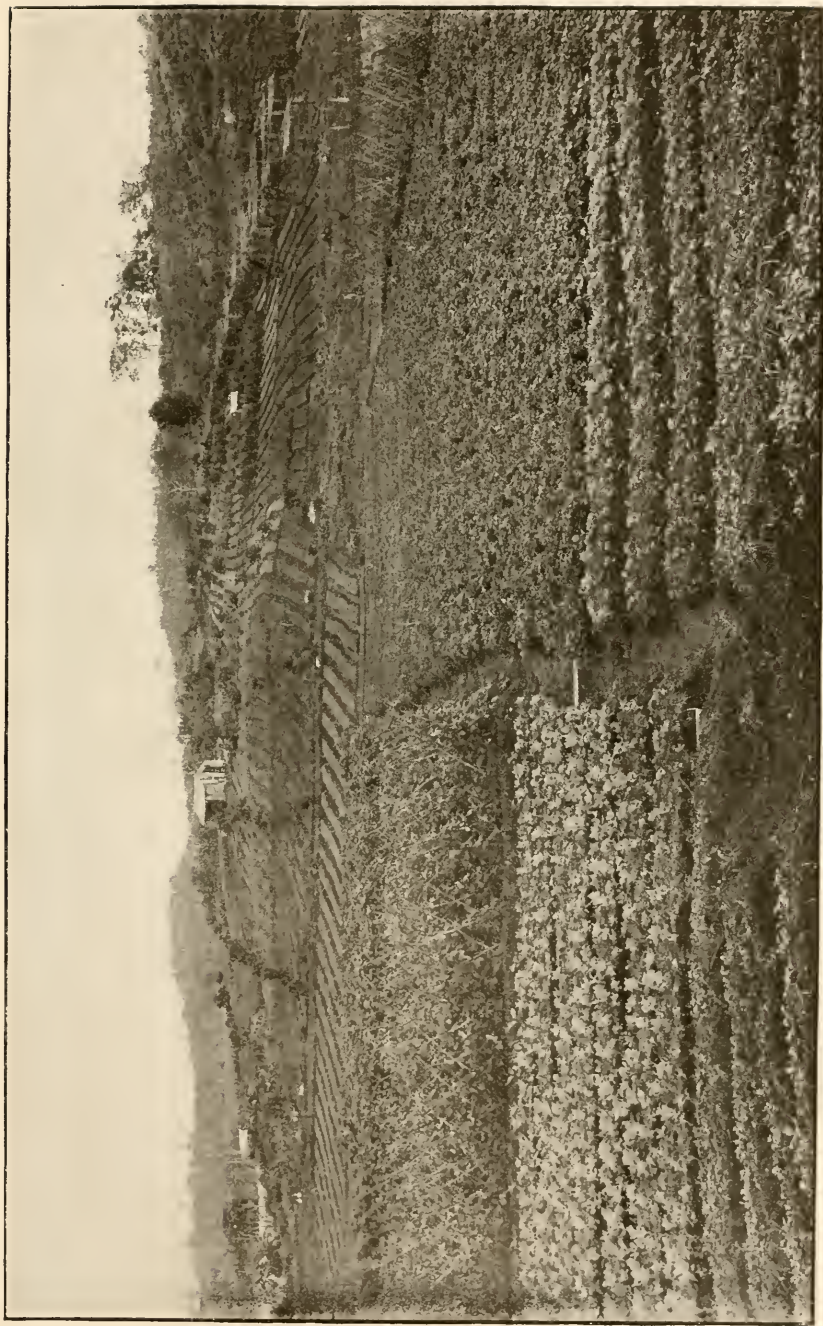
YAM PLANTS, NEW CULEBRA, SOUTH END OF FIELD. PLANTED JUNE 1, 1917.



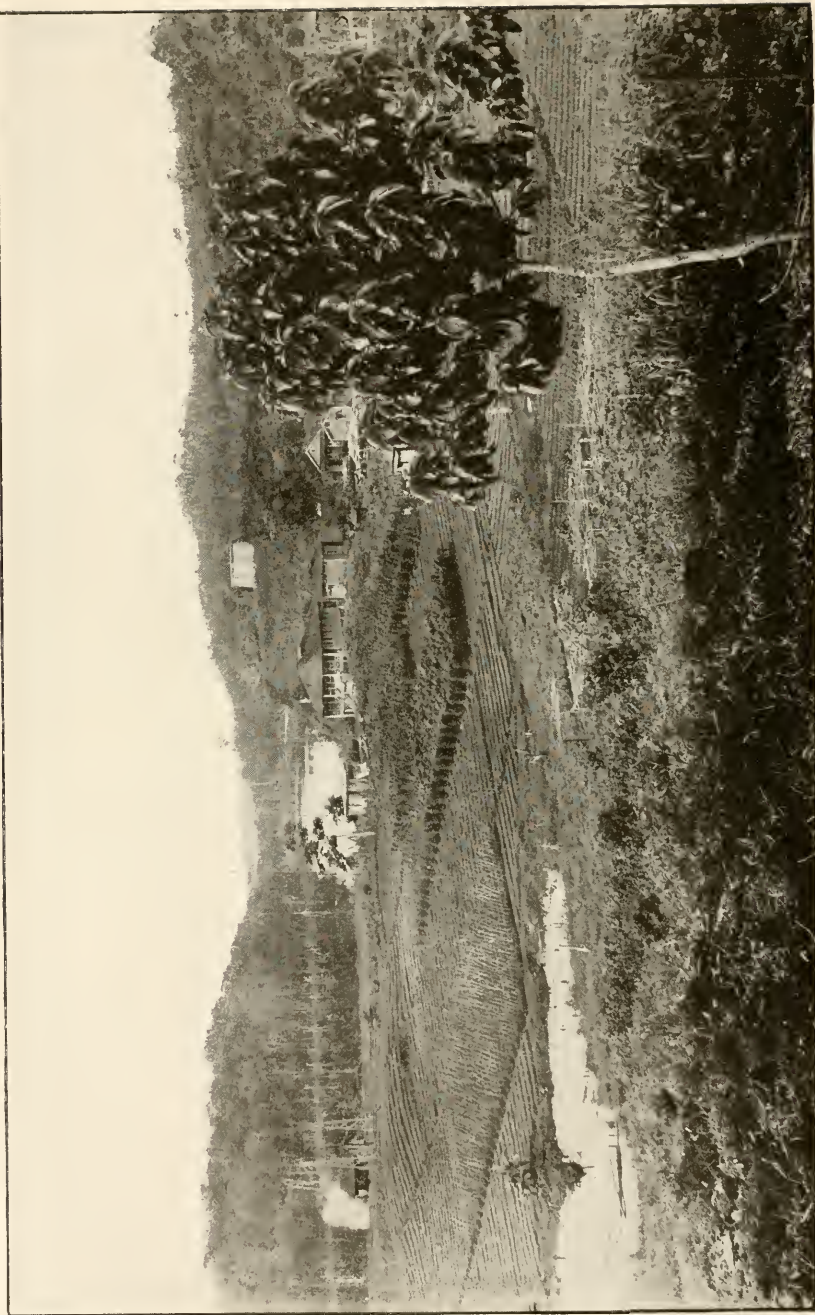
SWEET POTATO FIELD JUST PLANTED, LIMON PLANTATION. JUNE, 1917.



FRIJOLES TRUCK FARM. JUNE, 1917.



FRIJOLES TRUCK FARM. JUNE, 1917.



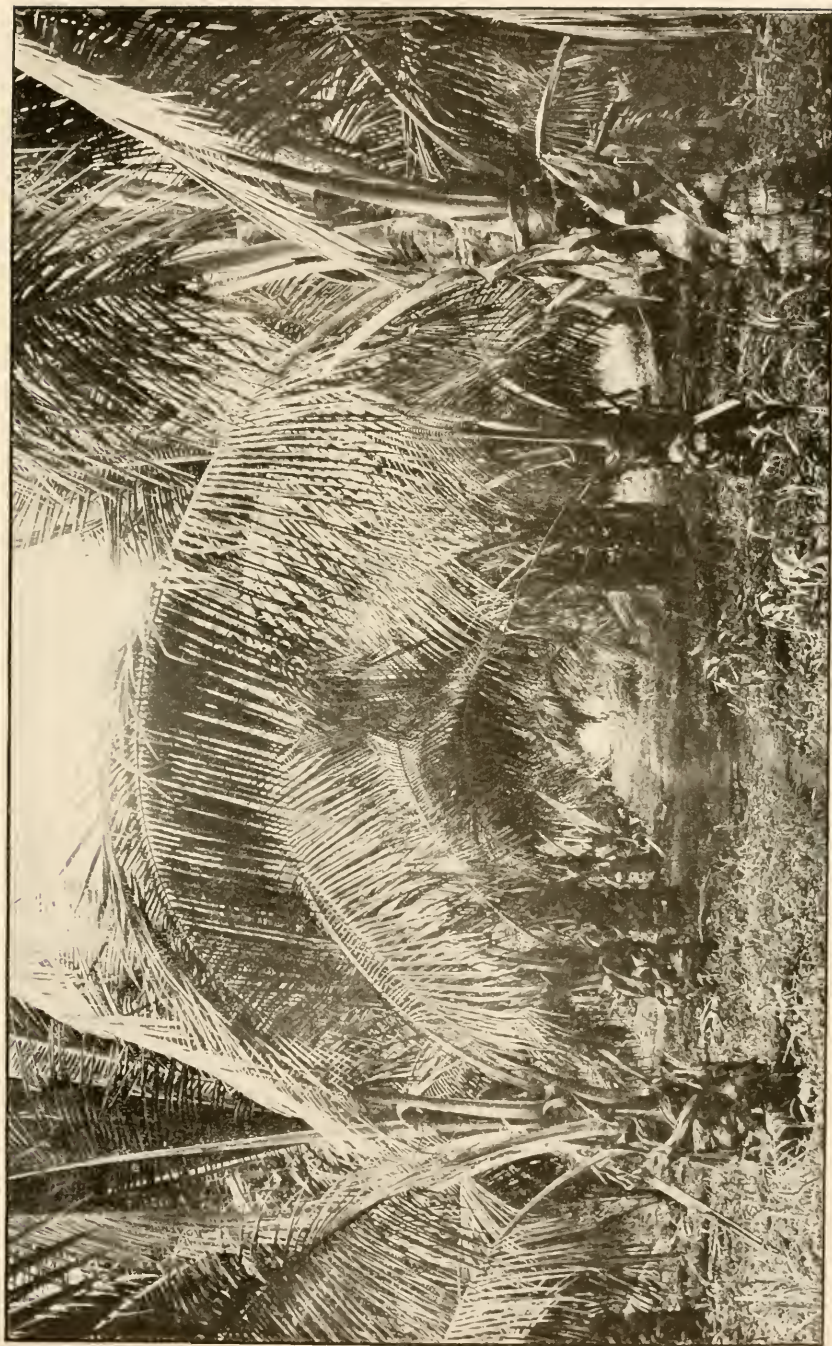
FRIOLES TRUCK FARM, SHOWING A TWO-YEAR-OLD AVOCADO TREE IN THE FOREGROUND. JUNE, 1917.



COCOANUT PALMS. SOUTH END VENADO PLANTATION JUNE, 1917.



COCOANUT PALMS. NORTH END VENADO PLANTATION. JUNE, 1917.



FOUR-YEAR-OLD TREES. VENADO PLANTATION. JUNE, 1917.



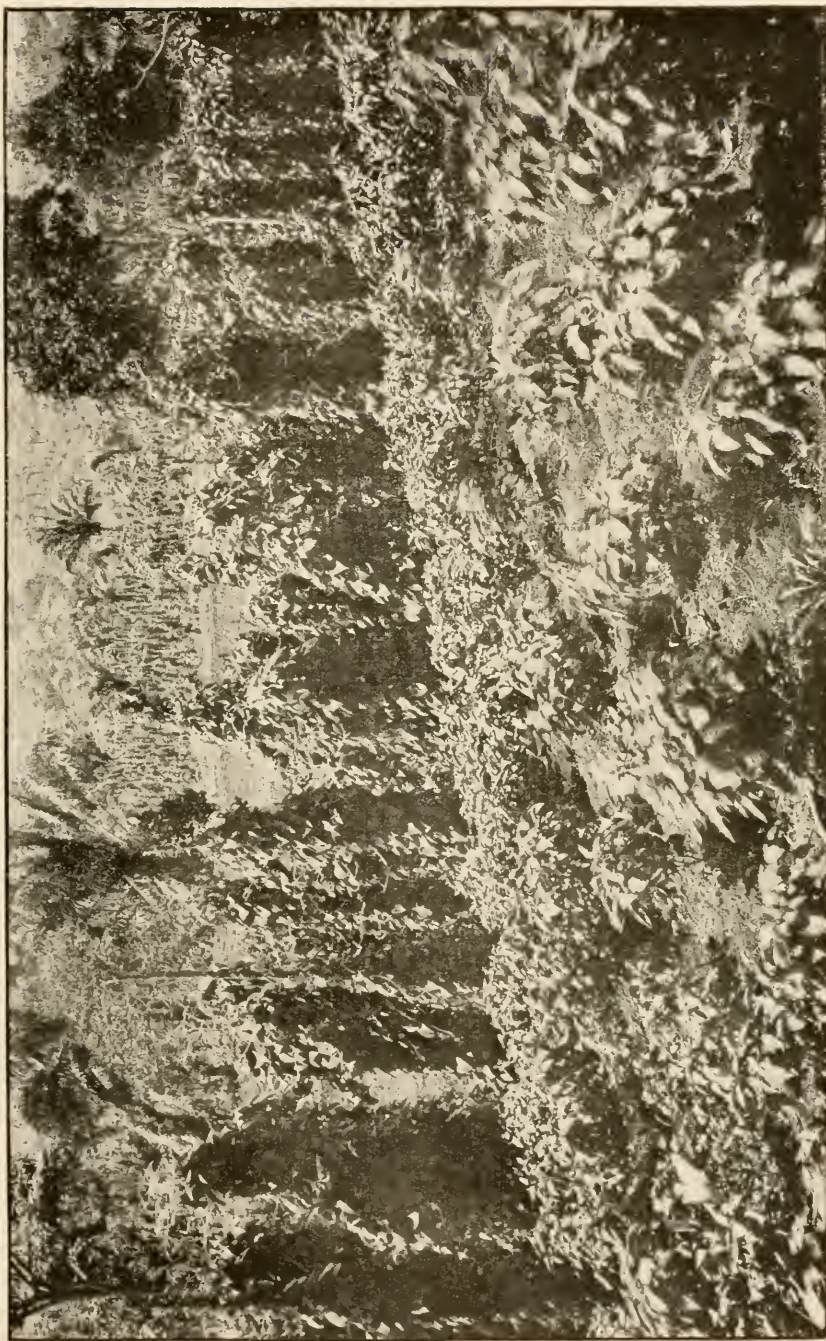
CLUSTER OF MANGOES. VENADO PLANTATION. JUNE, 1917.



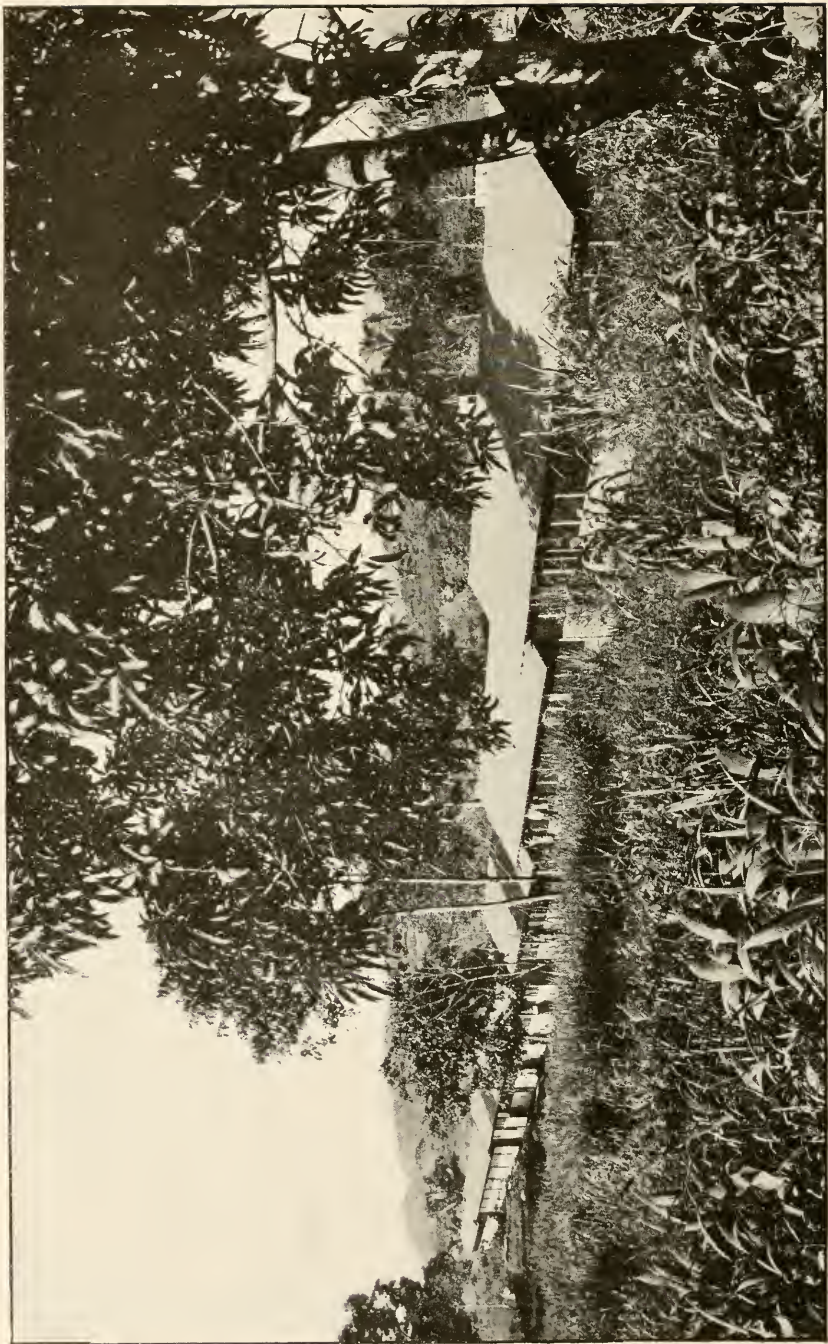
PAPAYA PLANTS. BRACHO PLANTATION. JUNE, 1917.



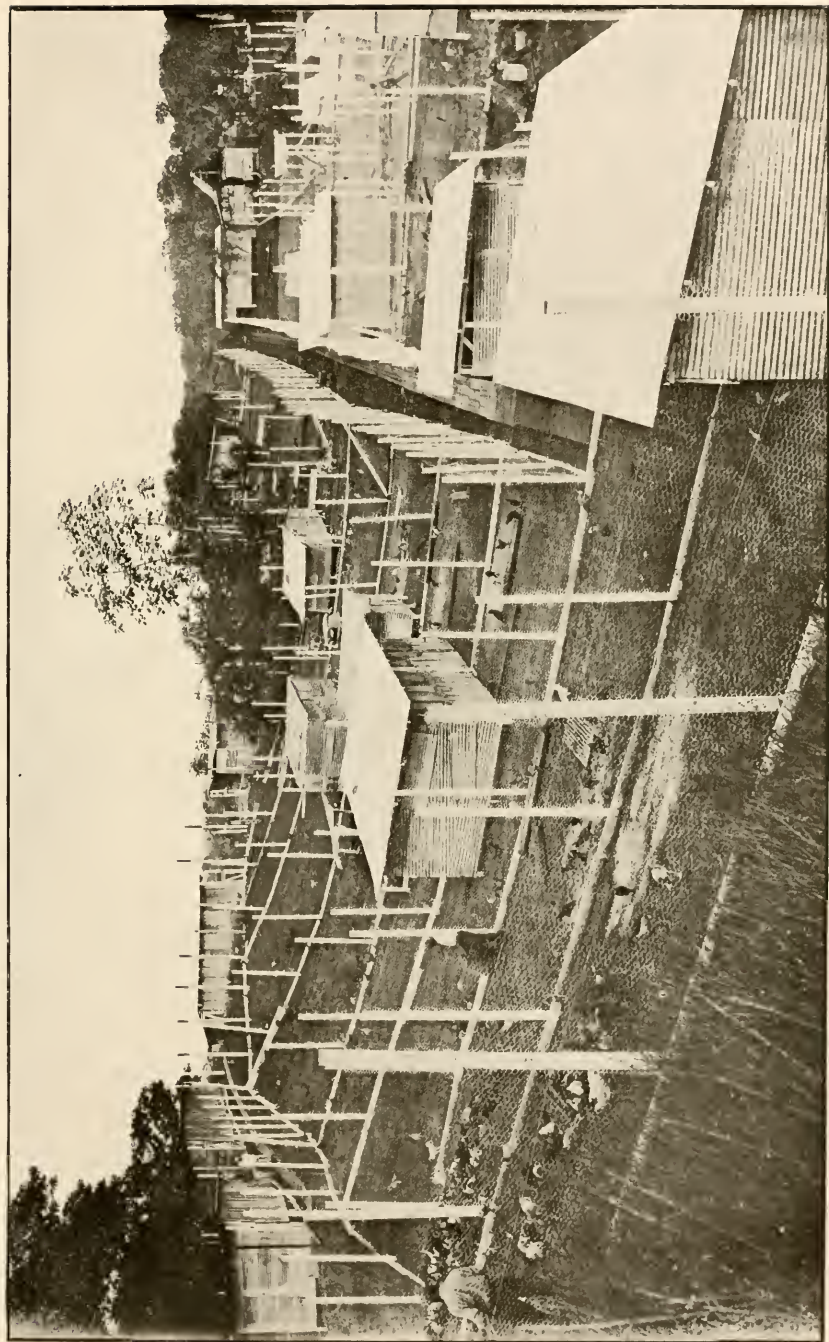
DRYING TRAYS. LAS CASCADAS CACAO PLANTATION. JUNE, 1917.



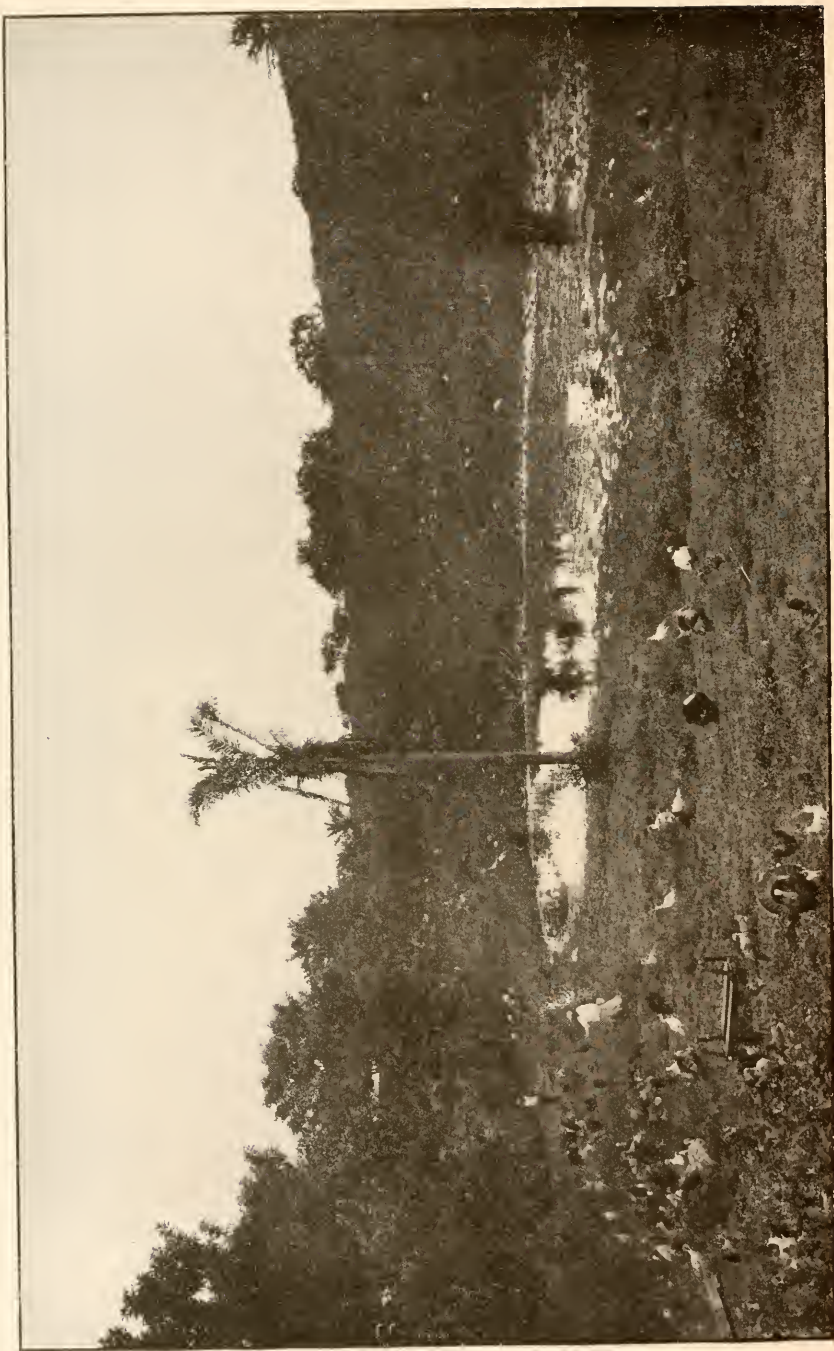
POLE BEANS AND GREEN PEPPERS. NEW CULEBRA TRUCK FARM. JUNE, 1917.



NEW CULEBRA CHICKEN FARM. FIRST SECTION OF BUILDING JUST BEING COMPLETED. JUNE, 1917.



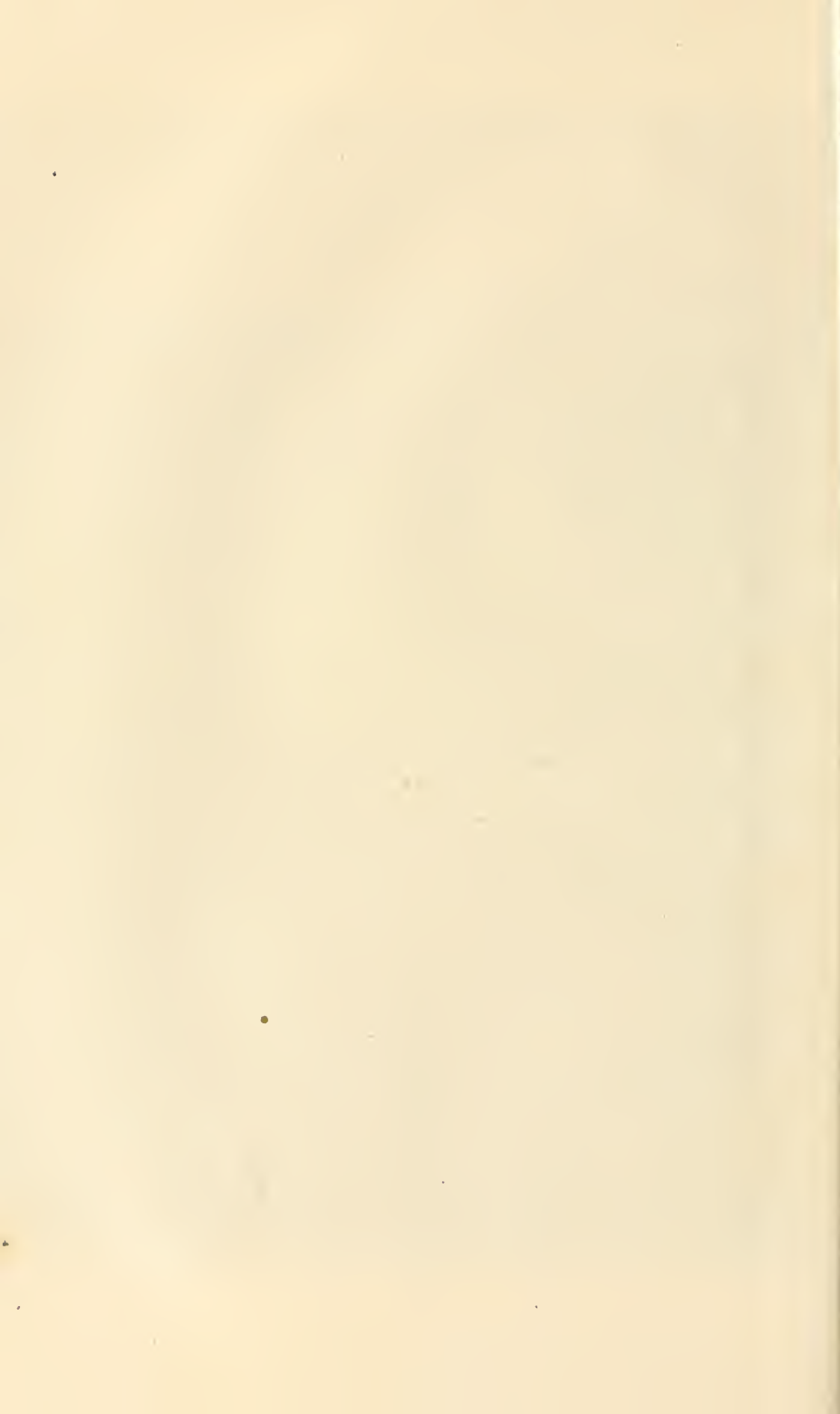
MINDI CHICKEN FARM. JUNE, 1917.



MINDI CHICKEN FARM. JUNE, 1917.

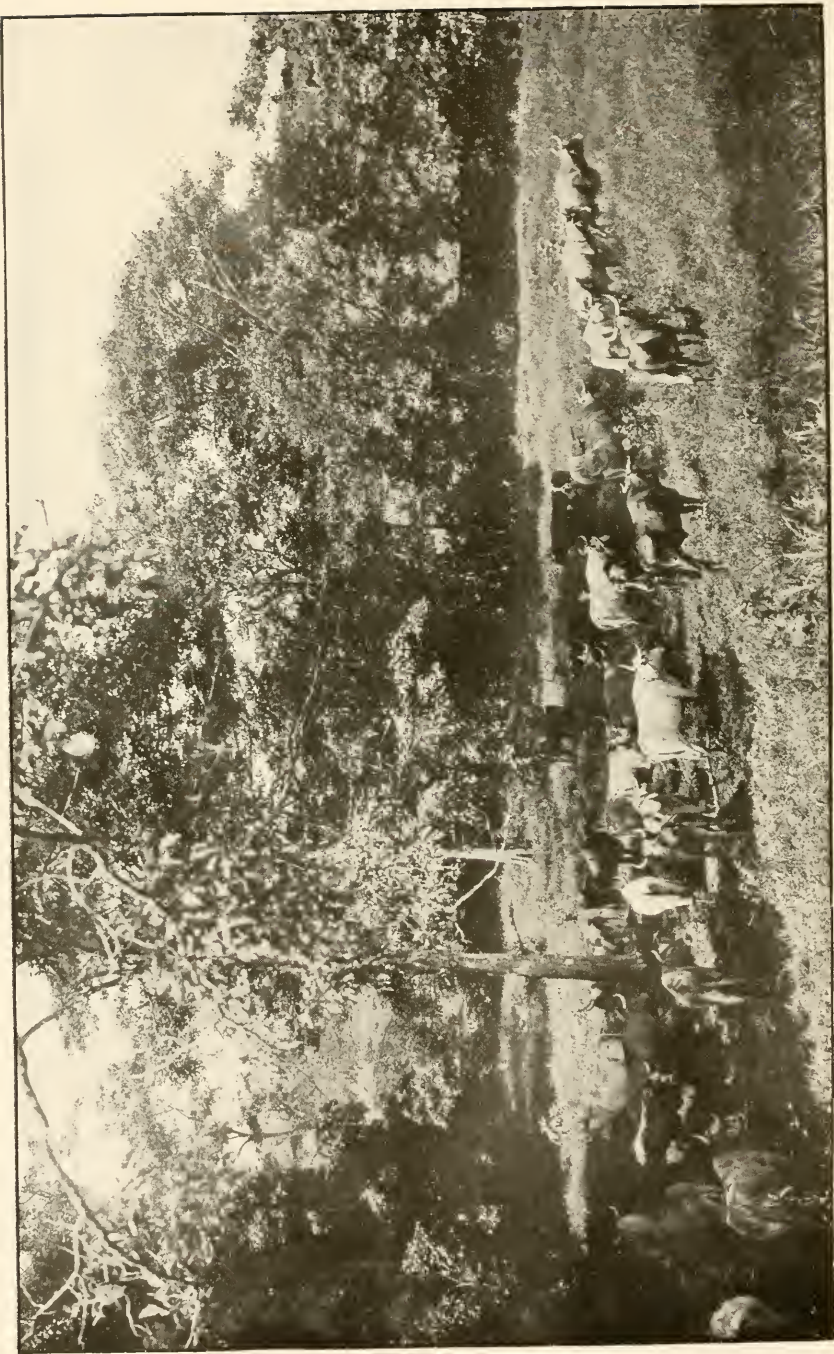


MANDINGO VALLEY, VIEW FROM THE MANDINGO FARM. LOOKING TOWARD GAMBOA FROM MANDINGO HILL. PASTURE BELOW ROAD IS 1 1/2 YEARS OLD AND THE EXTENT OF THE GUINEA IS EVIDENCED BY THE BLURRED EFFECT CAUSED BY THE HEAVY FEED TASSELS. APRIL, 1916.

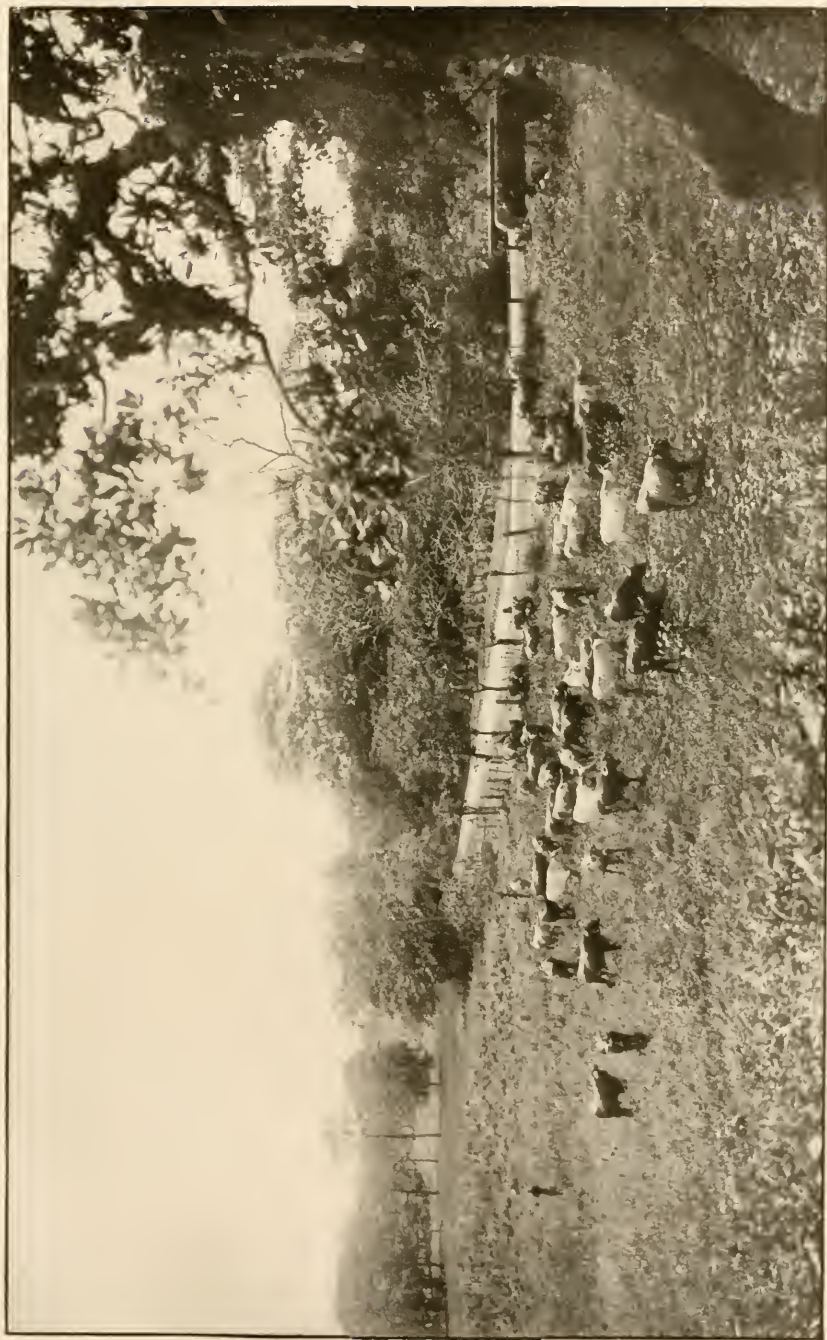




GUINEA GRASS AT MONTE LIRIO. THIS IS THREE MONTHS' GROWTH FROM SEED ON CLEAN-BURNED HEAVY CLEARING.
JUNE, 1917.



CATTLE INDUSTRY. CATTLE ON ATLANTIC PASTURES. JUNE, 1917.



CATTLE INDUSTRY. CATTLE ON ATLANTIC PASTURES. JUNE, 1917.

APPENDIX F.

REPORT OF THE AUDITOR IN CHARGE OF THE ACCOUNTING DEPARTMENT.

BALBOA HEIGHTS, CANAL ZONE, *August 20, 1917.*

SIR: I have the honor to submit the following report of the transactions of the accounting department for the fiscal year ended June 30, 1917.

ORGANIZATION.

The organization of the department has continued as set forth in the annual report for 1916, with such changes only as were considered necessary following the death of Mr. Ad. Faure, chief accountant, who had served with the canal in an important accounting capacity ever since his connection with the Isthmian Canal Commission in 1905. The division of auditing and accounting is under the immediate direction of the auditor, the division of disbursement under the paymaster, Mr. John H. McLean, and the division of collections under the collector, Mr. T. L. Clear. Judge B. F. Harrah has continued as assistant auditor in charge of the office of the department in the United States. Mr. Virgil C. Miller is the disbursing clerk in the Washington office. After the death of Mr. Faure the position of assistant auditor on the Isthmus was established and Mr. Elwyn Green appointed thereto. The functions of the department were divided among four main bureaus—the general accounting, costkeeping and property, claims, and railroad accounting—with other subordinate bureaus and sections.

PAYMASTER.

Disbursements to the amount of \$28,150,610.55 were made during the year by the paymaster. Of this amount the sum of \$9,363,739.34 was on account of the Panama Railroad Company. Employees on the gold rolls of The Panama Canal were paid \$6,206,950.72, those on the silver roll \$5,914,259.72, while the sum of \$6,665,660.77 was paid on miscellaneous vouchers. (See Table No. 37.) Collections made on pay rolls amounted to \$4,028,566.94. Of this amount the sum of \$3,822,212.07 was collected for coupon books and meal tickets, \$55,025.07 for rent, the remainder being for miscellaneous items. Of the collections made on pay rolls the sum of \$3,820,425.20 was disbursed directly by the paymaster, the balance, \$208,141.74, being transferred to the collector's accounts. The Commercial National Bank of Washington, D. C. (Panaman branch), has continued as a

Government depository as well as a fiscal agent. Small deposits of both Government and Panama Railroad funds are carried in this bank. Due to the failure of two local banks, the other banks on the Isthmus increased their cash balances, thus reducing materially the supply of cash with which to make payments. This made it necessary to bring in from the United States a larger sum than usual. The sum of \$1,425,500 in United States currency was secured. A large portion of this sum was in paper money, which is preferred by employees, but this money is seriously affected by the weather conditions and requires replacement in comparatively large quantities; \$59,417 in bills was sent to the States for redemption. As employees prefer payment in American currency one million pesos, Panaman currency (\$500,000 U. S. currency value), were withdrawn from circulation with the approval of the Republic of Panama, and replaced with gold coin. These pesos were sold through the Panama Railroad Company at a slight increase over the face value.

COLLECTOR.

The collections during the year repaid to appropriations amounted to \$7,844,602.02. The sum of \$6,007,269.65 was collected for deposit as miscellaneous receipts. Of these amounts, the sum of \$480,027.57 was received by the disbursing clerk in Washington. Deposits for the payment of toll and bills for supplies and services were made with the assistant treasurers of the United States, to the credit of the collector, in the sum of \$3,623,334.93. Similar deposits were made with the collector on the Isthmus in the sum of \$6,641,140.92. Of the total, \$10,264,475.85, the sum of \$593,677.89 was refunded upon settlement of accounts. Money-order funds to the amount of \$1,676,500 were transferred to the Postmaster General in the United States in payment of money orders drawn on the United States. Other disbursements of miscellaneous trust funds to the amount of \$200,940.02 were made by the collector. Collections were also made for account of the Panama Railroad Company in the amount of \$16,537,791.30. (See Tables Nos. 38, 39, and 47.)

ACCOUNTING TO THE TREASURY FOR COLLECTIONS.

Under the provisions of section 3 of the sundry civil act of March 3, 1915, there have been detailed regularly two employees, one from the Office of the Auditor for the War Department and the other from the Office of the Comptroller of the Treasury, to make the required semiannual examination of the accounts on the Isthmus. The reports submitted by these inspectors have indicated that they were very well satisfied with the manner in which the receipt and disbursement of Government funds were safeguarded.

CLAIMS FOR REFUND OF TOLLS.

The Congress, by the act of June 12, 1917, has authorized the refunding of the amounts erroneously collected as tolls, under the ruling of the Attorney General that the tolls collected under the Panama Canal rules for measurement must not exceed \$1.25 per ton, as determined in accordance with United States statutes relating to

net registered tonnage. The refunds will be made as soon as the exact amounts due can be ascertained. The tolls on vessels transiting the canal during the year amounted to \$5,631,781.66. The net registered tonnage of these vessels under United States rules amounted to 4,698,132 tons. If Panama Canal rules had applied, the sum of \$6,665,783.54 would have been collected. The limitation has therefore resulted in a loss of the sum of \$1,034,001.88. Vessels under foreign registry have been the beneficiaries and not the vessels of the United States except as to a relatively small number of American vessels carrying deck loads. Tables 67 and 67A in the annual report for 1916 contain a list of the vessels passing through the canal during that fiscal year, the tolls collected, the United States registered tonnage, the Panama Canal tonnage, and the amount which would have been collected under the Panama Canal rules of measurement. It is not considered necessary to publish a similar statement this year, as the table already published gives the essential data.

CLAIMS FOR DAMAGES TO VESSELS PASSING THROUGH THE LOCKS.

Several small claims for damages to vessels passing through the locks have been made in accordance with the provisions of section 5 of the Panama Canal act; also a few claims for damages arising in the canal and harbors. The sum of \$2,368.12 has been paid in settlement of five claims. All claims so far have been adjusted and settled by mutual agreement without recourse to the courts, as authorized by the Panama Canal act.

EXAMINATION OF PAY ROLLS.

The work of checking pay rolls under the provisions contained in the legislative, executive, and judicial appropriation act, approved August 23, 1912, that "Disbursing officers shall make only such examination of vouchers as may be necessary to ascertain whether they represent legal claims against the United States," has continued very satisfactorily.

CANAL APPROPRIATIONS.

Congress, to June 30, 1917, appropriated for the canal and the fortification thereof, a total of \$439,002,360.22. Of this amount \$28,580,347.30 were for fortifications, \$1,500,000 to cover six annual payments of \$250,000 each to the Republic of Panama for Canal Zone rights, and \$6,000 for the expense of presenting the launch *Louise* to the French Government. The sum of \$23,890,000 has been specifically appropriated for the operation and maintenance, sanitation, and civil government of the canal and the Canal Zone. Of the amounts appropriated other than specifically for maintenance and operation, the sum of \$4,289,159 was charged against operation and maintenance to the end of the fiscal year 1915, while \$2,225,000 of the general appropriations has been used for the stock of material and supplies for the operation and maintenance of the canal. Experience has shown that this sum of \$2,225,000 is too low an amount to cover the value of the stock required for operation and maintenance. On June 30, 1917, there were on hand material and supplies of a general

nature to the value of \$6,663,458.99. It appears that the stock of material will be maintained at not less than \$5,000,000 to supply the many needs in connection with the operation and maintenance of the canal, the construction work performed by it, and its commercial operations. This is exclusive of the stocks of coal of a value of \$581,309.54 and commissary supplies of a value of \$2,709,047.04, which are carried by the funds of the Panama Railroad Company. Deducting from the total appropriations the amount appropriated for fortifications, \$28,580,347.30; for Panama, \$1,500,000; for presenting the launch *Louise*, \$6,000; for operation and maintenance, \$30,404,159; including the amount for the stock of material and supplies, leaves \$378,511,853.92 appropriated for the construction of the canal and its immediate adjuncts. Of this amount, \$3,600,000 appropriated for colliers and coal barges, \$1,500,000 for Dock No. 6, Cristobal, \$300,000 for work on the colliers *Ulysses* and *Achilles*, and \$720,000 for reboiling and repairing the steamships *Ancon* and *Cristobal* were specifically exempted by law as a charge against the authorized bond issue. This leaves the sum of \$372,391,853.92 as chargeable against the bond issue. The balance available for appropriation within the limit of the cost of the canal and the authorized bond issue is \$2,831,302.08, the actual difference between the amount appropriated and the items which are exempt as a charge against the bond issue being increased by the appraised value of the American legation building in the city of Panama, \$22,256, which was transferred to the Department of State.

Miscellaneous receipts to June 30, 1917, amounted to \$19,848,549.80. Deducting the amount received as tolls, \$12,389,614.45, Canal Zone revenues deposited since July 1, 1915, \$260,855.60; also the profits on business operations, \$51,326.10; interest on the cost of public works in Panama and Colon and on bank balances, \$386,130.10; and the miscellaneous collections of \$530.15, gives the amount repaid on the cost of construction of \$6,760,093.40. I have taken credit for the amount paid by the Panama Railroad Company for subsidies, dividends, and interest, for The Panama Canal would have obtained the benefit of these amounts in reduced rates if they had not been added to the expenses of the railroad. Of the amount stated above, the sum of \$3,383,714.13 was received from material sold, services rendered, etc. Deducting the amount repaid on the cost of construction leaves the sum of \$365,631,760.52 as the amount expended or on hand for immediate expenditure for projects included within the estimate upon which the cost of the canal was based. The ultimate cost of the canal will be further reduced by receipts from the sale of construction material and equipment and by the payments to be made by the Republic of Panama for the amount expended on account of waterworks, sewers, and pavements in the cities of Panama and Colon. The cost of the canal as a commercial venture is also entitled to credit to the value of buildings and other public works, equipment, and plant transferred to the Army, the Alaskan Engineering Commission, and the State Department, without any actual payment therefor. The estimated value of items transferred is \$1,822,514.12. (See Tables Nos. 4 and 12.) The status of the authorized bond issue is shown in Table No. 1. The general balance sheet is published as Table No. 2.

EXCHANGE OF PROPERTY WITH PANAMA RAILROAD.

There is a loan standing against the Panama Railroad Company to enable the company to reequip its line, \$1,399,114.61, also one to enable the company to take up its first-mortgage bonds, \$1,848,217.50, a total of \$3,247,332.11. By section 2 of the act of Congress of March 4, 1911, it was provided that the company should not make any further payment on the principal or of interest on the notes given to the United States for the money appropriated for its use. As a result, the company has been enabled to construct docks at Cristobal at an expenditure about equal to the amount of the loans. Considerable equipment was purchased and paid for by The Panama Canal which is required in connection with the operation of the railroad and its steamship line, viz, the steamships *Panama* and *Colon* and a large amount of rolling stock. Certain docks at Balboa have been constructed by The Panama Canal and others by the Panama Railroad Company. It is essential, in order to simplify the transactions between the two interests, that an exchange should be made and that one interest only should have the title to each class of property. A provision authorizing this was included in the estimates for the fiscal year 1917 and also for the fiscal year 1918, but no action so far has been taken by the Congress. The railroad should own all equipment used in railroad operations; also the steamships it operates in its commercial business. The exchange that has been contemplated would effect this result and the United States would own directly all docks and terminal facilities at both ends of the canal, and the outstanding accounts would be settled.

PUBLIC WORKS, PANAMA AND COLON.

Under the agreement with the Republic of Panama, which requires the reimbursement of the United States for expenditures connected with the construction, operation, and maintenance of waterworks, sewers, and pavements in the cities of Panama and Colon, the expenditures to June 30, 1917, in Panama were \$2,124,069.08, and in Colon \$2,007,368.88, a total of \$4,131,437.96, including accrued interest to date at the rate of 2 per cent per annum on the capital cost balances and on the proportionate cost of waterworks in the Canal Zone used for supplying water to the two cities, based upon the quantity of water consumed. For the work in Panama, this interest has amounted to \$232,573.29, for the work in Colon \$188,388.79, and for the proportionate cost of waterworks in the Canal Zone \$82,425.65, a total of \$503,387.73. There has been reimbursed to the United States, or is immediately due, the sum of \$2,063,031.70, leaving a balance due of \$1,020,852.53 for the work in Panama and \$1,047,553.73 for the work in Colon, a total of \$2,068,406.26, payable in installments in the next 43 years. The amount which is payable immediately under the agreement is \$62,126.37 and is covered by bills for the difference between the current charges for the work plus the quarterly payments required and the amount collected as water rentals. On June 30, 1917, the agreement in regard to the maintenance of pavements by The Panama Canal expired. The officials of the Republic of Panama have

agreed that The Panama Canal shall continue to maintain the pavements while consideration is given permanent methods of handling.

CONSTRUCTION OF CANAL.

[Tables Nos. 16 et seq.]

During the fiscal year just ended there were classified as construction of canal \$7,674,648.94, which amount included \$712,007.22 for overhead expenses, leaving \$6,962,641.72 directly charged by divisions. The principal items comprised in this charge were:

Colon east breakwater, \$392,560.77, the principal item entering into this expense being placing concrete blocks, \$367,946.69, being 81,322.1 cubic yards of blocks manufactured and placed, at an average cost of \$4.5246 per cubic yard. (See Table No. 17.)

Dredging from Gatun to Pedro Miguel, \$380,755.71, includes 1,080,105 cubic yards of material removed from Gaillard Cut, at an average cost of \$0.3525 per cubic yard. (See Table No. 27.)

From Pedro Miguel to the sea there were expended \$161,316.95, the principal items being dredging in Miraflores Lake, \$36,169.56, covering 246,998 cubic yards of material removed, at an average cost of \$0.1464 per cubic yard (see Table No. 27); dredging between Miraflores locks and the sea, \$127,065.79, being 221,138 cubic yards removed, at an average cost of \$0.5745 per cubic yard (see Table No. 27). A credit of \$1,918.40 was given this account, due to adjustment of operations prior to the fiscal year 1917.

There were expended for aids to navigation \$22,368.36, the principal items entering into this expenditure being mooring stations in Gaillard Cut, \$9,071.64; boat landing at Gatun locks, \$1,501.02; signal station at Empire, \$1,346.10; at Sosa Hill, \$2,120.32; additional work on Bona Island Light, \$1,250; and five new buoys in Cristobal-Colon Harbor, \$6,005.73.

At Pedro Miguel and Miraflores there were expended on lock construction \$11,890.42 and \$11,423.94, respectively, mainly in back-filling.

There were expended for the power producing and transmitting system \$246,954.61, the extension of the Gatun hydroelectric station \$104,567.08, and operating machinery for same \$56,526.87, operating machinery Miraflores steam electric plant \$10,759.80; transformer substations \$64,595.83, and duct lines \$8,466.07; for distribution lines \$2,038.96.

In continuing the construction of the Atlantic terminal \$396,030.87 were expended for the Cristobal coaling plant, the principal items entering into this expense being preliminary and general work, \$14,451.80; dredging, \$83,419.75, covering the removal of 303,186 cubic yards of spoil at an average cost of \$0.2751 per cubic yard; superstructure, including the stocking and reclaiming bridges, unloader and reloader towers, and the conveyer system, \$278,097.69, including \$262,804.34 for payments to contractors.

There were expended \$20,411.95 in the construction of the fuel-oil plant at that point, the principal item being erection of tank No. 9.

In the construction of concrete quays, wharves, and piers at Cristobal, \$531,761.81 were expended for the construction of Pier No. 6 and boathouse between Piers Nos. 7 and 8. (See Tables 18 and 19.)

In continuing the construction of the Pacific terminal there were expended in preparatory work \$169,092.58; dredging inner harbor \$410,155.63, involving the removal of 1,945,860 cubic yards of material by dredges at an average cost of \$0.1852 per cubic yard, and the pumping of 1,378,977 cubic yards of spoil in connection with the reclamation of land at an average cost of \$0.0360 per cubic yard. Main dry dock, \$337,064.98, the principal items being preliminary and general work, \$10,844.99; pumping plant, \$39,416.54, of which amount \$33,971.61 covers payments to contractors; installation of miscellaneous machinery, capstans, crane track, fittings and bilge block, and electrical and general iron work, \$275,699.87, including \$66,767.23 for 50-ton crane; and entrance pier, \$14,650.80.

Coaling station, \$278,991.01, the principal items being coal-handling plant, \$234,666.92, \$169,841.21 of which represents payments to contractors and \$22,403.25 the continuation of the erection of the stocking and reclaiming bridges and installation of electrical equipment; sea wall and unloader wharf, \$11,725.29; and reloader wharf, \$26,519.13, mainly for fenders and backfilling.

Balboa shops, \$232,092.65, the principal items being general work, \$35,642.47; machine and erection shop, \$63,748.50; forge shop, \$9,853.48; boiler and ship-fitters' shop, \$14,698.97; galvanizing building, \$21,829.67; foundry, \$9,134.44; roundhouse, \$18,938.70; gas house, \$19,178.90; and compressor plant and pump house, \$15,903.07.

Quays, wharves, and piers, \$165,706.04, the principal items entering into this expense being quay wall D-E-F, \$55,434.59, principally for steel decking, reinforced concrete slab and track; quay wall I-J-M-N, \$8,186.79; Pier No. 18, \$76,743.91, chiefly for walks and roof; rat-proofing, \$19,894.79, largely for quay wall G-H-I.

Fuel oil plant, \$27,834.06, principally for pipe lines and tank No. 5.

For permanent town sites there were expended \$428,545.40, the principal items entering into this expense being Balboa town site, \$179,457.04, the principal items being for road construction, \$41,512.21; sewer system, \$15,338.39; walks, \$21,888.56; lot improvements, \$42,355.75; and underground duct system, \$38,657.02; Pedro Miguel town site, \$14,156.98, chiefly for general work and street lighting; Cristobal town site, \$20,838.15, principally for underground duct system; Colon Beach town site, \$193,001.88. For further details reference is made to Table No. 21.

For permanent buildings there were expended \$2,659,947.35, the principal items and their cost being: Storehouses, \$274,401.36; hotels and mess halls, \$208,232.22; gold quarters, \$1,062,537.90, including \$107,090.36 for four-family concrete houses and \$942,306.25 for new wooden quarters; silver wooden quarters, \$186,985.97; hospitals, \$329,916.38, consisting of \$14,213.78 for Colon Hospital and \$315,702.60 for Ancon Hospital; dispensaries, \$82,373.29; asylums, \$14,481.79; office and quarters building for dentists and sanitary inspectors, \$17,784.42; schoolhouses, \$344,315.07; Paraiso clubhouse, \$16,001.57; and motor truck garage at Ancon, \$19,493.04. For further detail see Table No. 22.

For sanitary fills, \$146,996.84 were expended at Mount Hope and \$32,193.18 along the Ancon-Corozal road; for sanitary ditches there were expended \$95,420.15.

For construction of roads, not included in town sites, there were expended \$111,851.54.

For playgrounds, including the Balboa grand stand, there were expended \$41,098.16.

There were charged to real estate for depopulation of the Canal Zone \$483,418.68, being awards of the Joint Commission and settlements by the land office.

Among the miscellaneous items of construction there were \$13,199.44 charged to Zone water supply system, and to Cristobal shop \$26,769.49.

MANUFACTURING PLANTS.

During the fiscal year just ended 246,580 cubic yards of sand and gravel were reclaimed from the Chagres River at an average cost of \$0.8235 per cubic yard. (See Table No. 30.)

The Gatun hydroelectric plant and the Miraflores steam electric power plant generated 43,743,902 kilowatt hours during the past year at an average production cost of \$0.0045 per kilowatt hour. The distributed cost was \$0.0073 per kilowatt hour. Included in the above cost is a charge for depreciation of the power transmission system of \$96,000, or \$0.0022 per kilowatt hour. (See Table No. 24.)

The Ancon-Balboa-Panama waterworks system produced 2,462,055,000 gallons of water at an average cost of \$0.0622 per thousand gallons. Of this amount 851,425,000 gallons were used in the city of Panama. The Gatun system produced 325,017,000 gallons of water at an average cost of \$0.1462 per thousand gallons. The Colon-Cristobal system produced 1,430,034,000 gallons at an average cost of \$0.0822 per thousand gallons. Of this amount 585,681,000 gallons were used in the city of Colon. (See Tables Nos. 32, 33, and 34.)

OPERATION AND MAINTENANCE.

[Table No. 6.]

There was expended in the operation and maintenance of the Canal the sum of \$6,788,047.60, as against \$6,999,750.15 last year. The main item of expense was \$2,612,480.17 for dredging 8,149,634 cubic yards of material from the slides in Gaillard Cut at an average cost of \$0.3206 per cubic yard. Last year there were expended for dredging in this area \$3,513,350.06 for the removal of 12,430,209 cubic yards of material at an average cost of \$0.2806 per cubic yard. (For detailed costs see Table No. 29.)

The expense for operation and maintenance of the locks increased from \$622,293.01 expended during the fiscal year 1916 to \$737,430.39 in the fiscal year 1917. The expense for operation of the locks increased by \$97,009.76; the expense of the marine division increased from \$154,891.97 to \$313,036.43. These increases were largely due to the increased business during the year. The expense for operating the floating derricks, which were purchased for emergency uses, amounted to \$202,034.37, as against \$101,858.04 during the prior year. Charges to operation and maintenance for overhead expenses were \$2,537,883.61, as against \$2,449,590.82 during the fiscal year ending June 30, 1916. Offsetting the total expense for operation

and maintenance are the amounts received as tolls, \$5,531,781.66; as licenses and taxes, court fees and fines, \$137,189.38; and the profit on business operations, \$39,427.66; or a total of \$5,808,398.70. This leaves an expense in excess of revenues of \$979,648.90, as against an excess last year of \$4,441,207.77, or a total to date of \$5,352,013.30. This amount is exclusive of charges that might be made for depreciation on the plant and equipment with a few minor exceptions, and interest on the capital investment.

OVERHEAD EXPENSES.

[Table No. 5.]

Overhead and general expenses include the expenses of general administration, civil government, health department, supply department, accounting department, etc., and during the past fiscal year have amounted to a total of \$4,986,433.42, as against \$4,549,099.62 for the year 1916, an increase of \$437,333.80. Of this amount \$1,165,142.69 was charged directly to other interests during the year 1917, as against \$1,015,000.13 during the year 1916, leaving a net amount to be distributed among the various activities of the canal this year of \$3,821,290.73, as against \$3,534,099.49 for the year 1916.

The expenses of the executive office were \$419,552.84, as against \$439,204.95 during the prior year. The expenses of civil government increased from \$545,271.10 to \$630,722.53. This increase of \$85,451.43 was largely in the divisions of police and prisons, schools, and posts. The gross expenses of the health department increased from \$942,310.44 to \$1,023,224.34, although the net increase in the expense of this department was from \$552,303.73 to \$581,921.21, or \$29,617.48. The gross expenses of the supply department increased from \$1,007,950.52 to \$1,324,746.96, the increase being mainly in the operation and repairs of quarters and the operation of storehouses.

The expenses of the accounting department, including the offices of the assistant auditor and the disbursing clerk, were reduced by \$2,805.77, or from \$469,167.81 to \$466,362.04. Services rendered the Panama Railroad Company this year amounted to \$136,002.87, as against \$136,118.24 last year. Due to the act of September 7, 1916, the amount charged to the account for compensation to injured employees was reduced from \$72,409.03 during the prior year to \$25,894.45 for the year 1917.

The expenses of the municipal engineering division increased from \$428,800.20 to \$478,996.80, due to the increased cost of repairing roadways and the operation and maintenance of waterworks.

BUSINESS OPERATIONS.

(Table No. 7.)

The total business operations carried on through Panama Canal funds amounted to \$7,540,160.78, the revenues derived from these being \$7,579,588.44. The three big items for which revenues were received were shopwork, \$2,190,705.52, sale of material from stock, \$1,210,768.10, and construction and repair work, \$996,133.38, while subsistence operations returned a revenue of \$783,862.97. The rev-

venues from business operations last year amounted to \$6,488,521.61. This indicates an increase of over \$1,000,000 during the last year. The increase in business is also indicated by the number and amount of bills registered during the past year. There were 16,386 bills registered, in the sum of \$17,007,342.16, as against 12,754 bills, amounting to \$11,786,187.91 during the prior year. These amounts are exclusive of Panama Railroad bills, in the sum of \$9,266,603.18, and of cash sales and sales for which commissary coupons are used in payment, the latter amounting to \$5,385,607.94.

CANAL ZONE ACCOUNTS.

Effective July 1, 1915, the revenues derived by the Canal Zone government from licenses and taxes, court fees and fines, postal receipts, etc., which had theretofore been appropriated separately for the support of the Canal Zone government, have been deposited in the Treasury of the United States and credited to miscellaneous receipts. The collections for licenses and taxes during the year amounted to \$15,302.98; court fees and fines, \$17,772.93; postal receipts, \$97,677.74; with miscellaneous items amounting to \$725.25; a total of \$131,478.90. During the prior year the sum of \$146,689.02 was collected. The cash balances of Canal Zone and miscellaneous funds in the hands of the collector have increased from \$478,433.76 on June 30, 1916, to \$1,090,252.70 on June 30, 1917. Of this amount, \$1,055,247.47 was money order and postal savings funds. All of the expenses of the Canal Zone were paid out of the regular appropriations for civil government, as contemplated by the appropriation acts. (For details see Tables Nos. 46 and 47.)

During the year 173,475 money orders to the value of \$3,782,763.71 were issued, as against 171,096 to the value of \$3,518,223.83 issued during the previous year. Since the establishment of the money-order business on the Isthmus, 2,020,240 orders have been issued to the value of \$47,833,732.87. There have been paid \$34,476,563.18 on money orders drawn on the United States. (See Tables Nos. 48 to 52, inclusive.)

CLUBHOUSE ACCOUNTS.

The revenues derived from the operation of the various clubhouses amounted to \$233,544.22, as compared with \$144,067.85 received during the prior fiscal year. The disbursements amounted to \$226,203.61. Soda fountain receipts amounted to \$91,402.54; cigars and candies, \$56,358.21; moving pictures, \$22,889.60. These items show large increases over prior years' receipts, while the receipts on account of membership fees were reduced from \$10,173.22 to \$8,738.07. All funds received by the clubhouses have been expended or obligated during the year. The cash balance on hand June 30, 1917, including amounts due for commissary coupons, amounted to \$15,137.17. (For further details see Tables Nos. 53, 54, and 55.)

CLAIMS FOR INJURIES AND DEATHS.

The act of September 7, 1916, again changed the basis for making allowances to employees of The Panama Canal and Panama Railroad on account of injuries and deaths occurring in the performance of

duty. The general effect of the law upon the American employees is to reduce the amount of the allowance, while in cases of permanent disability or death of silver employees, decided increases in the amounts allowed are authorized. The employees of The Panama Canal are now governed by the same rules as govern the allowances to employees of other departments of the United States. The settlement of claims is, however, vested in the Governor, by virtue of an Executive order issued by the President under date of September 15, 1916. The compensation paid to employees, both of The Panama Canal and the Panama Railroad, is chargeable to the injury compensation fund and not to the appropriations of The Panama Canal, as was heretofore the case.

There were reported during the fiscal year 4,068 accidental injuries and 39 accidental deaths of employees, and compensation was allowed in 1,445 cases of injuries and 15 cases of deaths. In 172 cases no compensation was allowed, as period of disability was less than seven days, 71 claims being disapproved for the reason that the employee was not directly engaged in actual work or in the performance of duty at the time of injury. In 26 cases the disability was held not to be the result of the injury described; in 67 cases the evidence was held to be insufficient to establish a claim; in 1 case disability commenced after separation from the service; in 2 cases the disability commenced more than six months after the injury; in 2 cases notice of injury was not given as required by the act; while in 2 cases the injury was held to have been caused by the employees' willful misconduct, and in 1 case by the intention of the employee to cause injury to himself or another.

Ten death claims were disapproved, 3 for the reason that death was not caused by an injury received while directly engaged in actual work or in the performance of duty, 3 for the reason that there were no dependents entitled to compensation, 1 for lack of evidence to establish claim, 1 for the reason that the disability causing death was not the result of an injury, and 2 for the reason that death was held to be due to the intention of the employee to cause injury or death to himself or another.

The sum of \$28,739.84 was allowed on account of injuries to employees of The Panama Canal and Panama Railroad, and the sum of \$25,907.92 was allowed on account of deaths. Of these sums, \$15,845.04 were on account of injuries under the act of September 7, 1916, and \$13,961.57 on account of deaths occurring after that act became effective. In addition, \$4,200 have been paid under special acts of Congress. The total amount paid by The Panama Canal as compensation on account of injuries and deaths of employees since August 1, 1908, the effective date of the act of May 30, 1908, excluding payments amounting to \$29,806.61 under the act of September 7, 1916, was \$1,394,137.83. Further details as to the amounts paid, the causes of accidents and the nature of the injuries received, will be found in Tables Nos. 56 to 62, inclusive.

COUPON BOOKS.

The use of a coupon book in the form of a mileage book has been continued through the year. Books to the value of \$3,726.495 have been issued to employees for pay-roll deduction, as against

\$3,250,132.50 issued during the prior year. In addition, books have been sold for cash to the value of \$1,660,000.25, making a total of \$5,386,495.25. Considerably less than half the coupons are received in the office attached to sales slips. The balance of coupons are received in bulk and are counted through the use of machines, one a motor-operated machine, the others hand operated. These machines were constructed at the instrument repair shop. Meal tickets to the value of \$137,649.89 were issued to silver employees. For further details, see Tables Nos. 42 to 45, inclusive.

INSPECTION OF ACCOUNTS.

The accounts of all officials and employees charged with the collection, disbursement, and custody of Panama Canal, Canal Zone, and Panama Railroad funds, or with other funds which are semi-public, have been examined at frequent and irregular periods, as contemplated by the regulations. Five hundred and twenty-six examinations were made during the year. These inspections involve the counting of cash and the examination of about 160 money accounts, besides a number of accounts of clerks issuing coupon books, meal tickets, and other papers having a money value. One defalcation case developed during the year, involving \$1,256; the amount was restored, so that no loss resulted.

TIME INSPECTION.

The inspection of time books and methods of timekeeping has been continued on the same general plan as heretofore used. Numerous minor errors have been discovered in the keeping of time, as well as several cases of "padded" time books and cases where time has been given by timekeepers for the purpose of securing commissary books for themselves. While there is some loss to the Government on account of these fraudulent practices, it is believed that the use of the time-inspection force keeps the loss to a minimum.

FREIGHT CLAIMS.

The freight-claim section has handled 4,687 new claims, which is 2,044 in excess of the number of claims handled during the preceding year. The amount involved in these claims has been in excess of \$300,000. The amount paid on account of claims and charged to the Isthmus operating accounts was \$90,340.23, while over \$80,000 will be charged against steamer operation. The exact figures of the latter are not available on the Isthmus.

BONDS OF EMPLOYEES.

The schedule bond of employees of the canal, executed to insure the faithful performance of their duties, was renewed with the Maryland Casualty Co. at the rates provided for the preceding year, namely, 65 cents for postal clerks, \$1.25 for postmasters, and \$1.70 for other employees. There were 270 Panama Canal employees bonded during the whole or part of the year. A similar bond covering Panama Railroad employees has been continued with the National Surety Co.

STOREHOUSE ACCOUNTS.

For use in making estimates for appropriations, for furnishing to stores and divisions statements of the value of material issued by or to them, and to aid in controlling the purchases to the amount appropriated, a material classification of 145 different classes has been adopted. The necessary data to make the statements are compiled by the use of tabulating machines with very good results.

The value of materials and supplies in the storehouses increased from \$4,428,593.29 on July 1, 1916, to \$6,048,984.70 on July 1, 1917. In addition, there was in the hands of divisions material not charged into the accounts to the amount of \$614,474.39. Material issued during the year amounted to \$8,797,096.55, while the sales amounted to \$548,988.32. (See Tables Nos. 63 and 64.)

COMMISSARY.

The commissary accounts show that supplies to the value of \$8,218,597.56 were purchased during the year, as against \$6,197,905.03 during the preceding year. These figures include cattle, hogs, and poultry slaughtered on the Isthmus to the value of \$811,923.97. Supplies costing delivered on the Isthmus \$6,870,671.95, including the beef, hogs, and poultry just referred to, were sold for \$8,548,921.13. The net profits for the year were \$194,605.01, as compared with \$160,995.50 last year. The c. i. f. value of supplies on hand June 30, 1917, was \$2,709,047.04, as against \$1,360,391.34 on June 30, 1916. The operating and manufacturing expenses were \$1,487,754.39. The total commissary investment is over \$6,000,000, made up as follows: Plant, stores, equipment, and other property, \$1,705,013.63; cattle industry, including the value of the steamship *Caribbean*, \$514,032.32; plantations, \$85,020.25; supplies, cattle, and plantation produce, \$2,888,006.01; floating capital, consisting of the value of supplies sold on a monthly settlement basis and advances in New York in payment of supplies en route, approximately \$1,000,000. The profits were a little more than 3 per cent on the investment and $2\frac{1}{2}$ per cent on the sales. The total profits from commissary operations since August, 1905, amount to \$924,577.71. A great deal more than this has been expended since that time in improving and enlarging the plant. The amount set up as accrued depreciation is \$451,553.59. (See Tables Nos. 65 and 66.)

PANAMA RAILROAD.

No change of importance has been made in the system of accounts of the railroad during the past year. Monthly statements are prepared which show at a glance the total revenues, the total expenses, the net income from month to month from the various railroad operations, which include the operations of the railroad proper, the terminal or dock operations, mainly covering the transfer of cargo between vessels, the operation of the coaling plants and the stables in Colon and Panama, the transfer of baggage, and the operation of motor busses in Ancon and Balboa, all under the superintendent of the railroad; also the operations of the telephone system, under

the electrical engineer, and the supply department operations, which include the commissaries, the plantations and cattle business, and the Hotel Washington.

The operations of the railroad proper show a profit of only \$18,730.66, as compared with \$825,628.99 last year. The gross revenues of the railroad show a reduction of \$1,229,905.73, while the gross operating expenses were reduced by \$423,007.40. Harbor terminal operations show a profit of \$135,425.78, as compared with \$48,948.29 for the prior year. The revenues at the Atlantic terminals amounted to \$1,281,169.50, an increase of \$331,116.21. At the Pacific end the revenues decreased \$272,493.44, due to the fact that nearly all steamships from the Pacific side go through the canal to Cristobal and exchange cargoes there. There was a decrease of \$27,854.72 in the total operating expenses, although the sum of \$109,998.12 depreciation was charged to operations, as compared with \$15,450.77 last year. The total investment in docks and wharves and other terminal facilities is over five and one-half million dollars. During the year approximately \$480,000 were spent in harbor terminal improvement and construction, \$204,000 of which were for the completion of Pier No. 7, which cost in all \$1,734,079.32. Other expenditures were for the new terminal office building, extension of Piers Nos. 6 and 7 mole, terminal track yards, and other improvements at Cristobal.

The operation of the telephone system cost \$100,245.33. The revenues derived from this service amounted to \$107,853.30. This system is operated primarily for the convenience of canal and railroad operations, and the service charged out at cost, the commercial revenue being comparatively small.

Stable operations, baggage transfer, and motor busses all show losses. The Washington Hotel, on the other hand, has shown a material increase in revenue, \$113,203.32 being received, as compared with \$88,050.19 last year. The net revenue of the hotel was \$2,464.99, as against a loss last year of \$12,454.70.

The receipts from the sale of coal during the year amounted to \$3,467,178.40, netting a profit of \$523,003.03. The expenses charged in connection with storing and delivering coal on the Isthmus amounted to \$399,635.18. Plant depreciation to the value of \$60,000 was charged to operations and set up as accrued depreciation during the year. The sum of \$67,500 was charged to operations to cover interest on the Panama Canal investment.

The accounts of the cattle industry have been kept so as to show separately the amount paid for cattle, purchasing expenses, transportation expenses, consisting mainly of the operation of the steamship *Caribbean*, and pasturing expenses. The amount paid for cattle was \$641,634.52; purchasing expenses, \$7,796.70; operation of steamship *Caribbean*, \$182,012.09; pasture operations, \$46,205.71. During the year 16,204 cattle were brought to the Isthmus and 13,307 were slaughtered. The first cattle were turned over to the abattoir at a price per head, but later this was changed to a rate per pound, live weight. The commissary has been charged \$788,213.75 for cattle slaughtered, or approximately \$59 per head. These cattle cost approximately \$55 per head, thus resulting in an apparent profit of \$52,330.55. Whether the cattle profit amounts to this depends upon the real valuation of the cattle in the pastures. During the year

\$242,348.92 were expended in pasture improvements and equipment. The total investment in the cattle industry to June 30, 1917, exclusive of the value of the cattle, was \$514,032.32, as follows: Pastures, \$343,650.44; steamship *Caribbean*, \$156,304.60; equipment, \$14,077.28.

All the operations of the railroad on the Isthmus show a net revenue of \$1,000,419.06, as compared with \$1,387,502.85 for the preceding year. The statements of revenues, expenses, and statistics of the Panama Railroad Company will be published in the annual report of that company. The essentials are included here so as to cover in one place, in a general way, all of the operations on the Isthmus.

Respectfully submitted.

H. A. A. SMITH,
Auditor, The Panama Canal.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

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THE PANAMA CANAL.

TABLE NO. 1.—*Status of authorized bond issue.*

Authorized bond issue-----		\$375,200,900.00
Appropriations by Congress to June 30, 1917-----	\$459,002,360.22	
Less appropriations for:—		
Fortifications-----	\$28,580,347.30	
Presentation of launch <i>Louise</i> -----	6,000.00	
Annual payment to Republic of Panama-----	1,500,000.00	
Maintenance, operation, sanitation, and civil government of canal-----	23,890,000.00	
	53,976,347.30	
Appropriated for canal construction-----	385,026,012.92	
Less amounts expended by law—		
Two colliers-----	2,000,000.00	
Two barges-----	1,600,000.00	
Dock No. 6, Cristobal-----	1,500,000.00	
Equipping colliers <i>Ulysses</i> and <i>Achilles</i> -----	250,000.00	
Covering unprotected surfaces of colliers-----	50,000.00	
Repairing steamships <i>Ancon</i> and <i>Cristobal</i> -----	720,000.00	
Expended for operation and maintenance of canal to June 30, 1915-----	4,289,159.00	
Stock of material and supplies for operation and maintenance of canal---	2,225,000.00	
	12,634,159.00	
	372,391.853.92	
Balance available for appropriation after June 30, 1917, within limit of cost of canal and authorized bond issue--		2,809,046.08

Appraised value of American legation building in the city of Panama, exempted from charge to bond issue, act July 1, 1916-----	\$22, 256. 00
Balance available for appropriation within the limit of cost of canal and authorized bond issue-----	2, 831, 302. 08

NOTE.—Of the amount authorized for construction under the authorized bond issue there have been collected for reimbursement of capital cost of public works in cities of Panama and Colon \$149,764.70, and for material sold, services rendered, etc., \$4,972,990.45, a total of \$5,122,755.15, which has been deposited as miscellaneous receipts to the credit of the general fund of the United States Treasury.

TABLE No. 2.—General balance sheet, June 30, 1917.

ASSETS.		LIABILITIES.	
Construction of canal (Table No. 16)-----	\$344, 877, 813. 01	Appropriations by Congress (Table No. 3)---	\$422, 050, 860. 22
Equipment and tools (Table No. 8)-----	10, 370, 382. 74	Trust funds and security deposits-----	115, 442. 27
Material, supplies, and equipment in store-houses (Table No. 10)---	6, 946, 383. 61	Reserves (Table No. 15)---	3, 191, 581. 77
Fortifications-----	17, 168, 187. 82	Assets received from Canal Zone Government (Table No. 11)-----	544, 792. 37
Public works in the cities of Panama and Colon-----	2, 474, 722. 09	Panama Railroad property operated by Panama Canal (Table No. 14)-----	882, 072. 20
Presentation of launch <i>Louise</i> to French Government-----	5, 840. 99	Reimbursements account public works in Panama and Colon repaid to appropriations-----	396, 956. 06
Reequipment loans to Panama Railroad Co.-----	1, 399, 114. 61	Accounts payable-----	3, 427, 812. 36
First-mortgage bond loan to Panama Railroad Co-----	1, 848, 217. 50	Miscellaneous receipts, United States funds (Table No. 4)---	\$19, 848, 549. 80
Maintenance and operation of canal (Table No. 6)-----	18, 025, 630. 65	Less deposited in United States Treasury---	19, 410, 928. 63
Annual payment to Republic of Panama for Canal Zone rights-----	1, 250, 000. 00		437, 621. 17
Assets transferred to other departments, United States Government (Table No. 12)---	1, 822, 514. 12		
Panama Canal property operated by Panama Railroad (Table No. 13)-----	1, 900, 380. 54		
Credit to miscellaneous receipts, United States funds other than tolls--	\$7, 458, 935. 35		
Less amounts not credited to assets (Table No. 4)---	2, 485, 944. 90		
Work in progress (Table No. 9)-----	562, 350. 25		
Accounts receivable-----	2, 401, 138. 36		
Appropriation balances subject to requisitions (Table No. 36)-----	12, 088, 606. 27		
Cash in hands of fiscal officers-----	2, 932, 865. 41		
Total-----	431, 047, 138. 42	Total-----	431, 047, 138. 42

TABLE No. 3.—Statement of appropriations by Congress.

Canal rights from French company (act of June 28, 1902)-----	\$40, 000, 000. 00
Canal Zone rights from Republic of Panama (act of Apr. 28, 1904)-----	10, 000, 000. 00
Canal connecting Atlantic and Pacific Oceans:	
Act of June 28, 1902-----	\$10, 000, 000. 00
Act of Dec. 21, 1905-----	11, 000, 000. 00
	21, 000, 000. 00

Deficiency for fiscal year 1906 (act of Feb. 27, 1906):

Miscellaneous material purchases in United States-----	\$1,000,000.00	
Miscellaneous material purchases on Isthmus-----	400,000.00	
Payments to Panama Railroad Co-----	200,000.00	
Isthmian pay rolls-----	2,100,000.00	
Salaries and services in the United States--	75,000.00	
New equipment purchases-----	1,565,786.00	
Reequipment of Panama Railroad-----	650,000.00	
		<u>\$5,990,786.00</u>

Total for purchase of rights and for lump-sum appropriations common to all departments-----	<u>76,990,786.00</u>
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Expenses in the United States:

Salaries-----	\$1,476,056.33	
Incidental expenses-----	583,179.36	
		<u>2,059,235.69</u>

Construction and engineering:

Pay of officers and employees-----	29,443,212.00	
Pay of skilled and unskilled labor-----	101,809,961.00	
Miscellaneous material purchases, etc-----	109,881,514.24	
Incidental expenses on Isthmian-----	6,640,250.00	
		<u>247,774,937.24</u>

Civil administration:

Pay of officers and employees-----	4,507,000.00	
Pay of skilled and unskilled laborers-----	191,000.00	
Material and expenses-----	1,178,200.00	
		<u>5,876,200.00</u>

Sanitary department:

Pay of officers and employees-----	5,391,000.00	
Pay of skilled and unskilled laborers-----	3,036,968.00	
Material and expenses-----	5,662,367.15	
		<u>14,090,335.15</u>

Reequipment of Panama Railroad-----	4,185,000.00	
Relocation of Panama Railroad-----	7,815,000.00	
Redemption of first-mortgage bonds of Panama Railroad Co----	2,298,367.50	
Sanitation in cities of Panama and Colon-----	800,000.00	
Survey of lands, Canal Zone-----	75,000.00	
Relief of Pembroke B. Banton for injuries-----	10,000.00	
Construction and equipment-----	23,005,000.00	
		<u>307,989,075.58</u>

Total for fiscal years 1907 to 1918, inclusive-----	<u>384,979,861.58</u>
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Total for canal construction, rights, etc., to June 30, 1917--	<u>384,979,861.58</u>
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Private acts for relief:

Elizabeth G. Martin, June 17, 1910-----	\$1,200.00
Marcellus Troxell, Jan. 13, 1911-----	1,500.00
W. L. Miles, Feb. 13, 1911-----	1,704.18
Chas. A. Caswell, Mar. 2, 1911-----	1,056.00
Heirs of Robert S. Gill, July 3, 1912-----	2,520.00
Douglas B. Thompson, July 3, 1912-----	1,500.00
Allesandra Comba, July 10, 1912-----	500.00
Peter Wiggington, Feb. 7, 1913-----	500.00
Raymond R. Ridenour, Feb. 7, 1913-----	500.00
Heirs of Charles E. Stump, Feb. 7, 1913-----	1,500.00
Parents of Edward Maher, Feb. 18, 1913-----	1,980.00
Oscar F. Lackey, Feb. 18, 1913-----	1,500.00
Pedro Sanchez, Feb. 18, 1913-----	2,000.00
John H. Cole, Feb. 18, 1913-----	1,951.33
Robert Coggen, Feb. 18, 1913-----	1,500.00
Wife of William Goodley, July 17, 1914-----	1,000.00
John Burrows, Feb. 27, 1915-----	1,433.33
F. W. Theodore Schroeter, Mar. 3, 1915-----	1,397.66
L. V. Thomas, Mar. 3, 1915-----	1,680.00

Private acts for relief—Continued.

Joseph A. Buckholdt, Aug. 4, 1916-----	\$3,000.00
Olaf Nelson, Aug. 8, 1916-----	1,200.00

\$31,122.55

Judgments of the Court of Claims, War:

Act of Aug. 26, 1912-----	196.45
Act of Mar. 4, 1913-----	900.00
Act of July 29, 1914-----	905.38
Act of Feb. 28, 1916-----	1,000.00
Act of Sept. 8, 1916-----	2,537.20

5,539.03

9,489.76

Judgment, United States court (act of Apr. 6, 1914)-----

Presenting steam launch *Louise* to French Government (act of

6,000.00

Aug. 25, 1914)-----

Fortifications:

Aeronautic station-----	\$250,000.00
Aviation seacoast defenses-----	500,000.00
Armament of fortifications-----	13,103,000.00
Army quarters, storehouses, etc-----	3,990,000.00
Buildings and materials-----	57,375.00
Causeway-----	150,000.00
Electric light and power plants-----	264,631.00
Field fortifications and camps-----	394,350.00
Fire control-----	633,301.30
Land for military purposes-----	50,000.00
Land defenses-----	29,500.00
Maintenance of clearings and trails-----	116,900.00
Maintenance, etc., of fire-control installations-----	20,000.00
Maintenance of searchlights and electric power equipment-----	22,500.00
Ordnance depot-----	359,700.00
Preservation and repair of fortifications--	40,000.00
Reserve equipment for fortifications-----	50,000.00
Sanitary clearing, filling, etc-----	210,000.00
Seacoast batteries-----	6,102,000.00
Searchlights for seacoast fortifications--	443,440.00
Submarine mines-----	659,450.00
Submarine mine structures-----	322,200.00
Submarine base-----	750,000.00
Surveys-----	62,000.00

28,580,347.30

Annual payment to Republic of Panama:

Act of Mar. 4, 1913-----	250,000.00
Act of Apr. 6, 1914-----	250,000.00
Act of Jan. 25, 1915-----	250,000.00
Act of Feb. 28, 1916-----	250,000.00
Act of July 1, 1916-----	250,000.00
Act of Mar. 3, 1917-----	250,000.00

1,500,000.00

Maintenance and operation of the canal:

Maintenance and operation-----	19,950,000.00
Sanitation-----	2,100,000.00
Civil government-----	1,840,000.00

23,890,000.00

Total appropriations by Congress to June 30, 1917----- 439,002,360.22

NOTE.—Of the above amounts appropriated no items of the sundry civil act of June 12, 1917, was covered into the Treasury until July 2, 1917, except the item of \$700,000 for sanitation. Following are the amounts not included in cash at the end of the fiscal year:

Construction and equipment-----	\$2,755,000.00	Submarine mine base-----	\$750,000.00
Maintenance and operation-----	9,000,000.00	Aeronautic station-----	250,000.00
Civil government-----	700,000.00	Submarine mines-----	2,500.00
Maintenance of clearings and trails-----	20,000.00	Maintenance, etc., fire-control installations-----	10,000.00
Preservation and repair of fortifications-----	10,000.00	Aviation, seacoast defenses-----	500,000.00
Maintenance of searchlights and electric power equipment-----	7,500.00	Armament of fortifications--	2,788,000.00
Seacoast batteries-----	332,000.00	Ordnance depot-----	86,500.00
		Total-----	17,211,500.00

DETAIL OF ACTS FOR MAINTENANCE AND OPERATION, SANITATION, CIVIL
GOVERNMENT, AND CONSTRUCTION AND EQUIPMENT.

	Mainte- nance and operation.	Sanita- tion, Canal Zone.	Civil gov- ernment, Panama Canal, Canal Zone.	Total.	Construc- tion and equip- ment.
Act of Mar. 3, 1915.....	\$5,200,000	\$700,000	\$540,000	\$6,440,000	\$10,500,000
Act of July 1, 1916.....	5,750,000	700,000	600,000	7,050,000	9,750,000
Act of June 12, 1917.....	9,000,000	700,000	700,000	10,400,000	2,755,000
Total.....	19,950,000	2,100,000	1,840,000	23,890,000	23,005,000
Amount appropriated for construction but used for maintenance and operation and not chargeable against authorized bond issue (act of Aug. 1, 1914, sec. 12):					
Maintenance and operation prior to July 1, 1915.....	4,289,159	.....	.....	.....	.....
Stock of material for maintenance and operation.....	2,225,000	.....	.....	.....	.....
Total for maintenance and operation..	26,464,159	.....	.....	.....	.....

TABLE NO. 4.—*Detail of miscellaneous receipts, United States funds.*

	Amount.
Receipts involving no appropriation expenditures:	
Subsidies from Panama Railroad Company.....	\$631,875.00
Dividends on Panama Railroad stock.....	344,945.00
Interest on reequipment loan.....	320,799.11
Interest on first mortgage bond loan.....	152,395.16
Interest on public works, Panama and Colon.....	280,557.15
Interest on Zone water supply systems, proportion.....	82,425.65
Interest on bank balances.....	23,147.30
Miscellaneous rentals.....	238,650.08
Pay-car overages.....	502.15
Forfeitures.....	28.00
	<u>\$2,075,324.60</u>
Receipts involving expenditure from appropriations:	
Not credited to assets—	
Capital cost, Panama waterworks and sewers.....	40,579.25
Capital cost, Panama pavements.....	35,234.70
Capital cost, Colon waterworks and sewers.....	39,052.69
Capital cost, Colon pavements.....	34,898.06
Tolls.....	12,389,614.45
Licenses and taxes.....	29,457.04
Court fees and fines.....	34,926.37
Postal receipts.....	194,700.12
Miscellaneous, Canal Zone.....	1,772.07
	<u>12,800,234.75</u>
Credited to assets—	
Sale of property.....	850,500.11
Sale of French material and equipment.....	112,825.67
Sale of Panama Canal building, in city of Panama.....	80,000.00
Sale of water.....	255.43
Mess accounts.....	46,879.48
Hospital receipts.....	79,992.68
Quarantine receipts.....	24,900.53
Laundry receipts.....	7,382.01
Rental of lands and buildings.....	41,427.24
Rentals, miscellaneous.....	137,822.99
Telegraph and telephone receipts.....	3,547.35
Hotels and messes.....	758,470.34
Hotel coupon books.....	32,238.28
Corral receipts.....	8,628.56
Labor furnished Panama Railroad Company.....	180,336.97
Other labor furnished.....	27,449.55
Repayments, reequipment loan.....	1,387,714.92
Repayments, first mortgage bond loan.....	300,000.00
Sale of Panama Railroad stock.....	1,500.00
Miscellaneous.....	93,805.47
Sale of construction material and equipment.....	746,186.77
Profit on business operations.....	51,326.10
	<u>4,972,990.45</u>
Total.....	<u>19,848,549.80</u>

	Amount.
Miscellaneous receipts deposited in United States Treasury.....	\$19,410,928.63
Cash on hand June 30, 1916.....	353,447.11
Amount of water rentals, Panama and Colon, credited to miscellaneous receipts.....	\$512,747.50
Amount of water rentals, Panama and Colon, deposited as miscellaneous receipts.....	470,422.87
Profit on business operations, 1917, not transferred to miscellaneous receipts.....	42,324.63
Unpaid bills.....	39,427.66
	2,421.77
Total	10,848,549.80

TABLE NO. 5.—Statement of overhead expenses, fiscal year 1917.

	Fiscal year—	
	1917	1916
Civil government:		
Civil affairs—		
Administration.....	\$9,381.03	\$2,411.91
Posts.....	155,030.12	133,708.87
Customs.....	22,615.25	19,787.98
Estates.....	17.35	2,417.45
Total civil affairs.....	187,043.75	158,326.21
Schools.....	85,820.09	67,218.34
Fire protection.....	68,528.28	69,164.71
Police and prisons.....	244,274.18	207,492.80
District court.....	17,643.62	16,557.36
Magistrate courts.....	11,459.90	12,046.77
District attorney.....	7,621.69	6,978.74
Canal Zone marshal.....	8,281.66	7,460.45
Municipal expenses.....	49.36	25.72
Total civil government.....	630,722.53	545,271.10
Charged to other interests.....	34,402.32	32,843.89
Amount apportioned.....	596,320.21	512,427.21
Health department:		
Administration.....	4,374.54	.....
Medical storehouse.....	3,774.20	.....
Ancon Hospital.....	382,961.50	332,453.60
Colon Hospital.....	59,501.80	48,858.40
Santo Tomas Hospital.....	11,740.69	11,136.23
Palo Seco Leper Asylum.....	24,102.89	21,782.19
Corozal Farm and Insane Asylum.....	92,898.02	74,835.82
Other hospitals and dispensaries.....	40,988.69	44,646.35
Quarantine service.....	71,410.33	61,957.47
Sanitation—		
Panama.....	47,910.90	47,523.73
Colon.....	33,555.35	38,409.57
Canal Zone.....	164,874.99	180,180.92
Street cleaning and garbage disposal—		
Panama.....	56,088.62	53,224.65
Colon.....	29,041.82	27,301.51
Total health department.....	1,023,224.34	942,310.44
Charged to other interests.....	441,303.13	390,006.71
Amount apportioned.....	581,921.21	552,303.73
Supply department:		
Maintenance and care of administration building.....	26,403.87	25,770.39
Operation of storehouses.....	586,456.15	503,954.12
Repairs to storehouses.....	912.32	1,460.86
Handling freight on docks.....	93,423.26	58,921.93
Operation of quarters.....	395,117.68	306,606.02
Repairs to quarters.....	219,026.89	104,500.00
Repairs to other buildings.....	1,314.63	2,126.94
Ancon Nursery.....	2,062.16	4,610.26
Total.....	1,324,746.96	1,007,950.52
Charged to other interests.....	155,702.45	131,802.57
Amount apportioned.....	1,169,044.51	876,147.95

TABLE No. 5.—Statement of overhead expenses, fiscal year 1917—Continued.

	Fiscal year—	
	1917	1916
Accounting department:		
Accounting office.....	\$333,645.55	\$234,432.65
Paymaster's office.....	45,303.77	49,329.72
Collector's office.....	34,860.57	35,103.03
Total.....	413,809.89	418,865.40
Charged to other interests.....	136,002.87	136,118.24
Amount apportioned.....	277,807.02	282,747.16
Washington office:		
Assistant auditor's office.....	41,543.32	39,460.14
Disbursing clerk's office.....	11,008.83	10,842.27
General bureau.....	60,235.29	56,065.29
Purchasing expenses.....	200,924.26	204,638.74
Total.....	313,711.70	311,006.44
Charged to other interests.....	1,637.67	708.08
Amount apportioned.....	312,074.03	310,298.36
Miscellaneous:		
Transportation of employees on Isthmus.....	144,025.50	151,125.00
Recruiting and repatriating.....	55,823.04	56,463.40
Telephones.....		60,000.00
Compensation to injured employees.....	25,894.45	72,409.03
Land office.....	11,348.37	17,656.28
Special attorney.....	10,772.99	10,276.32
Adjustments.....		133.82
Total.....	247,864.35	368,063.85
Charged to other interests.....	22,865.69	27,932.60
Amount apportioned.....	224,998.66	340,131.25
Administration:		
Executive office—		
Executive.....	33,005.40	35,173.81
Miscellaneous bureaus—		
Correspondence bureau.....	47,913.60	59,425.22
Record bureau.....	43,677.78	50,514.36
Personnel bureau.....	21,217.42	25,025.49
Property and requisition bureau.....	25,769.54	28,909.18
General bureau.....	42,791.44	41,958.06
Timekeeping bureau.....	86,560.85	98,325.73
Clubs and playgrounds.....	62,481.89	48,291.36
Canal Record.....	11,514.48	10,806.28
Official motor cars.....	18,529.41	15,779.74
Cables and radiograms.....	8,070.11	7,348.42
Miscellaneous.....	7,197.55	17,647.30
Bureau of statistics.....	10,823.37	.....
Total executive office.....	419,552.84	439,204.95
Charged to other interests.....	93,579.93	96,250.14
Amount apportioned.....	325,972.91	342,954.81
Engineer of maintenance:		
Office engineer.....	64,418.53	11,827.05
Surveys.....	30,774.66	41,753.55
Meteorology and hydrography.....	31,081.04	28,835.73
Total.....	126,274.23	82,416.33
Charged to other interests.....	59,998.63	18,130.14
Amount apportioned.....	66,275.60	64,286.19
Electrical division:		
Lights—streets, lodge halls, and churches.....	7,529.78	5,210.39
Amount apportioned.....	7,529.78	5,210.39

TABLE NO. 5.—*Statement of overhead expenses, fiscal year 1917—Continued,*

	Fiscal year—	
	1917	1916
Municipal engineering:		
Operation and maintenance of waterworks.....	\$342,567.45	\$309,254.58
Repairs to sewer system.....	12,823.73	10,444.41
Repairs to roads.....	123,605.62	109,101.21
Total.....	478,996.80	428,800.20
Charged to other interests.....	219,650.00	181,207.76
Amount apportioned.....	259,346.80	247,592.44
Grand total—administration.....	3,332,486.55	3,061,518.08
Charged to other interests.....	689,437.24	592,149.53
Amount apportioned.....	2,643,049.31	2,469,368.55
Total overhead expenses.....	4,986,433.42	4,549,099.62
Charged to other interests.....	1,165,142.69	1,015,000.13
Total amount apportioned.....	3,821,290.73	3,534,099.49
Distribution:		
Operation and maintenance of canal.....	2,537,883.61	2,449,590.82
Construction of canal.....	702,234.23	665,545.98
Fortifications.....	187,298.95	160,108.83
Business operations.....	370,133.78	245,412.63
Expenses of sales—construction, material, and equipment.....	18,751.39	12,736.70
Public works in cities of Panama and Colon.....	4,988.77	173.53
Presentation of launch <i>Louise</i> to French Government.....		531.00
Total.....	3,821,290.73	3,534,099.49

TABLE NO. 6.—*Panama Canal operation and maintenance to June 30, 1917,*

	Fiscal years 1914 and 1915.	Fiscal year 1916.	Fiscal year 1917.	Total to date.
Marine division:				
Admeasurement of vessels.....	\$10,667.25	\$7,905.40	\$13,759.01	\$32,331.66
Local inspection.....	4,679.08	4,075.36	4,515.46	13,269.90
Aids to navigation.....	48,871.71	58,848.34	97,823.93	205,543.98
Pilotage.....	61,776.92	41,342.29	104,216.83	207,336.04
Operation of harbor tugs—balance.....	2,491.77	42,720.58	60,566.91	105,779.26
Operation of port captains' offices—balance.....			26,120.91	26,120.91
Assisting vessels through cut.....			6,033.38	6,033.38
Total marine division.....	128,486.73	154,891.97	313,036.43	596,415.13
Lock operation and maintenance:				
Operation of locks (1914).....	4,274.16			4,274.16
Gatun locks—				
Superintendence.....	17,398.37	12,970.82	19,174.89	49,544.08
Operation.....	101,494.91	80,991.61	107,750.57	290,237.09
Maintenance of machinery and equip- ment.....	130,803.74	140,073.13	117,021.45	387,898.32
Maintenance of structure.....	32,105.13	16,130.71	19,533.74	67,769.58
Miscellaneous supplies and expenses.....	2,718.52	2,079.37	3,772.59	8,570.48
Total Gatun locks.....	284,520.67	252,245.64	267,253.24	804,019.55
Gatun spillway—				
Operation.....	1,128.50	860.06	1,026.23	3,014.79
Maintenance of machinery and equip- ment.....	7,572.01	5,046.05	12,881.40	25,499.46
Maintenance of structure.....	6,082.60	11,226.34	5,944.86	23,253.80
Total Gatun spillway.....	14,783.11	17,132.45	19,852.49	51,768.05
Pedro Miguel lock—				
Superintendence.....	14,921.07	16,369.88	20,969.18	52,260.13
Operation.....	78,964.47	49,356.32	62,159.26	190,480.05
Maintenance of machinery and equip- ment.....	68,495.13	62,282.39	95,262.82	226,040.34

TABLE No. 6.—*Panama Canal operation and maintenance to June 30, 1917—Continued.*

	Fiscal years 1914 and 1915.	Fiscal year 1916.	Fiscal year 1917.	Total to date.
Lock operation and maintenance—Contd.				
Pedro Miguel lock—Continued.				
Maintenance of structure.....	\$25,500.77	\$15,861.02	\$25,780.15	\$67,141.94
Miscellaneous supplies and expenses.....	1,952.18	2,770.80	5,306.73	10,029.71
Total Pedro Miguel lock	189,833.62	146,640.41	209,478.14	545,952.17
Pedro Miguel dams—Maintenance.....	42.00	91.59	35.37	168.96
Miraflores locks—				
Superintendence.....	17,323.13	17,577.33	24,826.93	59,727.39
Operation.....	102,239.26	67,258.16	105,966.93	275,464.35
Maintenance of machinery and equip- ment.....	93,844.15	101,588.72	89,179.47	284,612.34
Maintenance of structure.....	24,250.97	13,033.17	15,651.85	52,935.99
Miscellaneous supplies and expenses.....	3,324.44	3,243.11	3,459.44	10,026.99
Total Miraflores locks.....	240,981.95	202,700.49	239,084.62	682,767.06
Miraflores spillway and east dam—				
Operation.....	696.95	431.95	951.90	2,080.80
Maintenance of machinery and equip- ment.....	8,927.54	1,951.95	610.09	11,489.58
Maintenance of structure.....	907.01	750.81	57.06	1,714.83
Total Miraflores spillway and east dam.....	10,531.50	3,134.71	1,619.05	15,285.26
Miraflores west dam—Maintenance.....	377.17	347.72	107.48	832.37
Total lock operation and maintenance.....	745,344.18	622,293.01	737,430.39	2,105,067.58
Dredging:				
Atlantic entrance.....	125,563.30	26,478.35	22,864.17	174,905.82
Gatun Lake.....			442.88	442.88
Gaillard Cut.....	1,633,030.06	3,513,350.06	2,612,480.17	7,758,860.29
Miraflores Lake.....	2,253.44		83,024.52	85,277.96
Pacific entrance.....	8,628.79	20,187.63	135,819.51	164,635.93
Total dredging.....	1,769,475.59	3,560,016.04	2,854,631.25	8,184,122.88
Gatun dam, maintenance.....	48,773.29	20,230.04	15,889.75	81,893.08
Removal of floating obstructions.....	31,058.95	20,372.17	23,203.11	74,634.23
Gatun-Mindi levee, maintenance.....	26,939.54	1,772.05	2,582.14	31,293.73
Colon, west breakwater, maintenance.....	134.54	41,328.32	41,479.89	82,942.75
Naos Island breakwater, maintenance.....	4,492.21	58.45	9,642.89	14,193.55
Damages to vessels in locks.....		787.78	141.36	929.14
Damages to vessels in canal.....	2,417.07	948.83	3,818.44	7,184.34
Operation of floating derricks.....		101,838.04	202,034.37	303,892.41
Maintenance of transportation tracks.....	37,171.63	25,602.63	46,273.97	109,048.23
Shop expense, Balboa—balance.....	19,158.55			19,158.55
Loss on sales and services to outsiders.....	61,823.17			61,823.17
Total operation and maintenance.....	2,875,275.45	4,550,159.33	4,250,163.99	11,675,598.77
Proportion of overhead expenses.....	1,413,883.55	2,449,590.82	2,537,883.61	6,401,357.98
Total.....	4,289,159.00	6,999,750.15	6,788,047.60	18,076,956.75
Revenues:				
Tolls.....	4,358,002.37	2,399,830.42	5,631,781.66	12,389,614.45
Licenses and taxes, court fees and fines, etc.....		146,813.52	137,189.38	284,002.90
Profit on sales and services to outsiders.....		11,898.44	39,427.66	51,326.10
Total revenues.....	4,358,002.37	2,558,542.38	5,808,398.70	12,724,943.45
Expenses in excess of revenues.....		4,411,207.77	979,648.90	5,352,013.30
Revenues in excess of expenses.....	68,843.37			

TABLE NO. 7.—Statement of profit and loss on business operations for fiscal year ended June 30, 1917.

	Cost.	Revenues.	Profit (+) or loss (-).
DEPARTMENT OF OPERATION AND MAINTENANCE.			
Construction and repairs.....	\$993,708.74	\$996,133.58	+ \$2,424.84
Shopwork.....	2,195,604.23	2,190,705.52	- 4,898.71
Electric work.....	218,133.14	218,349.56	+ 216.42
Electric current.....	68,118.06	72,596.31	+ 4,478.25
Compressed air.....	80.37	73.39	- 6.98
Train service and use of rolling equipment.....	881.33	828.47	- 52.86
Tug service.....	122,919.32	103,825.39	- 19,094.43
Service of other floating equipment.....	28,895.73	30,110.52	+ 1,214.79
Pilotage.....	22,074.91	43,730.80	+ 21,655.89
Wharfage.....	11,990.49	22,587.06	+ 10,596.57
Sales of water.....	135,725.80	147,034.70	+ 11,308.90
Panama waterworks.....	75,529.12	75,529.12	.....
Panama pavements.....	22,214.97	22,214.97	.....
Colon waterworks.....	57,096.40	57,096.40	.....
Colon pavements.....	12,678.41	12,678.41	.....
Handling lines on locks.....	23,729.96	19,615.50	- 4,114.46
Handling lines on docks.....	17,391.41	.....	- 17,391.41
Steamship inspection.....	.....	3,119.17	+ 3,119.17
Dredging.....	69,981.85	69,406.29	- 575.56
Minor services, supplies and property.....	84,222.23	85,305.14	+ 1,082.91
Dry dockage—Balboa.....	68,246.42	108,093.71	+ 39,847.29
Dry dockage—Cristobal.....	11,052.86	16,472.49	+ 5,419.63
Total, department of operation and maintenance.....	4,240,276.25	4,295,506.50	+ 55,230.25
SUPPLY DEPARTMENT.			
Subsistence:			
Hotel Tivoli.....	165,480.19	151,476.94	- 14,003.25
Hotel Aspinwall.....	11,657.75	10,807.49	- 850.26
Line hotels.....	536,259.47	478,457.19	- 57,802.28
Messes.....	146,211.71	142,924.75	- 3,286.96
Minor services, supplies and property.....	196.60	196.60	.....
Total, subsistence.....	859,805.72	783,862.97	- 75,942.75
QUARTERMASTER.			
Material from stock.....	1,183,389.59	1,210,768.10	+ 27,378.51
Rock, sand, gravel, and screenings.....	26,902.72	27,085.43	+ 182.71
Printing and binding.....	21,810.65	21,934.10	+ 123.45
Corral.....	50,730.32	52,670.90	+ 1,940.58
Miscellaneous jobs.....	82,265.00	86,741.74	+ 4,476.74
Rental of gold quarters.....	8,033.58	8,033.58	.....
Rental of silver quarters.....	59,210.90	86,420.30	+ 27,209.40
Garage rental.....	1,194.39	4,857.52	+ 3,663.13
Ancon nursery.....	2,436.81	2,436.81	.....
Handling of fuel oil.....	32,891.22	48,701.57	+ 15,810.35
Operation of stores.....	54,000.00	54,000.00	.....
Operation of quarters.....	60,000.00	60,000.00	.....
Minor services, supplies and property.....	491.03	491.26	+ .23
Fuel oil.....	124,870.89	172,658.87	+ 47,787.98
Total, quartermaster.....	1,708,227.10	1,836,800.18	+ 128,573.08
ACCOUNTING DEPARTMENT.			
Lost metal checks.....	44.82	1,545.79	+ 1,500.97
Cablegrams.....	1,493.06	2,786.13	+ 1,293.07
Service of Panama Railroad.....	134,494.97	134,505.77	+ 10.80
Total, accounting department.....	136,032.85	138,837.69	+ 2,804.84
HEALTH DEPARTMENT.			
Ancon Hospital:			
Fees.....	221,145.59	128,304.15	- 92,841.44
Mess.....	22,403.97	20,932.09	- 1,471.88
Burials.....	3,643.38	3,513.39	- 129.99
Miscellaneous.....	1,773.72	1,680.85	- 92.87
Colon Hospital:			
Fees.....	22,604.32	17,944.71	- 4,749.61
Mess.....	2,850.18	2,504.19	- 345.99
Miscellaneous.....	24.90	24.90	.....
Palo Seco Leper Asylum.....	16,652.27	12,004.41	- 4,647.86
Line dispensaries.....	1,419.57	1,455.57	+ 36.00
Quarantine:			
Subsistence.....	28,518.54	15,678.23	- 12,840.31
Other charges.....	11,639.85	11,639.85	.....

TABLE No. 7.—*Statement of profit and loss on business operations for fiscal year ended June 30, 1917—Continued.*

	Cost.	Revenues.	Profit (+) or loss (—).
HEALTH DEPARTMENT—continued.			
Sanitation:			
Panama.....	\$6,969.20	\$6,969.20	—
Colon.....	10,234.33	10,198.45	— \$35.88
Zone.....	6,575.77	6,583.13	+ 7.36
Street cleaning:			
Panama.....	38,583.31	38,583.31	—
Colon.....	16,403.00	16,403.00	—
Corozal Hospital:			
Product.....	13,450.35	14,399.77	+ 949.42
Pasturage.....	201.00	204.00	+ 3.00
Burials.....	471.76	457.63	— 14.13
Insane asylum.....	45,503.47	67,287.67	+ 21,784.20
Sales from medical store.....	12,799.42	12,890.06	+ 90.64
Total, health department.....	483,957.90	389,658.56	— 94,299.34
CIVIL GOVERNMENT.			
School tuition.....	3,502.69	3,502.69	—
Sale of school books.....	526.15	524.88	— 1.27
Police service.....	24,024.53	24,024.53	—
Minor services, supplies and property.....	1,556.67	1,732.37	+ 175.70
Total, civil government.....	29,610.04	29,784.47	+ 174.43
EXECUTIVE DEPARTMENT.			
Service to Panama Railroad Company.....	66,079.00	66,079.00	—
Photographs and prints.....	679.17	679.17	—
Canal Record.....	223.98	451.43	+ 227.45
Motor car service.....	3,294.30	3,267.04	— 27.26
Minor services, supplies and property.....	29.97	29.97	—
Total, executive department.....	70,306.42	70,506.61	+ 200.19
MISCELLANEOUS.			
Land rental.....	255.95	17,536.06	+ 17,792.01
Building rental.....	95.92	4,975.67	+ 4,879.75
Land office expense.....	12,000.00	12,000.00	—
Equipment rental.....	2.03	17.23	+ 15.20
Joint land commission transcripts.....	102.50	102.50	—
Total, miscellaneous.....	11,944.50	34,631.46	+ 22,686.96
Total.....	7,540,160.78	7,579,588.44	+ 39,427.66

TABLE No. 8.—*Detail of equipment and tools.*

	Amount.		Amount.
Steamship Cristobal.....	\$716,085.43	Quartermaster.....	\$277,940.73
Steamship Ancon.....	728,271.88	Subsistence.....	13,987.39
Two colliers.....	1,988,531.54	Executive.....	25,211.05
Two floating cranes.....	890,513.46	Health.....	198,065.27
Dredging.....	3,406,043.33	Building.....	4,646.39
Mechanical.....	170,198.51	Terminals.....	2,358.95
Marine.....	731,621.94	Civil government.....	17,913.53
Locks operation.....	1,019,416.75		
Electrical.....	153,038.89	Total.....	10,370,382.74
Municipal engineering.....	26,537.70		

TABLE No. 9.—*Detail of work in progress.*

	Amount.
Uncompleted work, mechanical division.....	\$380,765.85
Uncompleted work, other divisions.....	172,522.60
McClintic-Marshall lock gate claim.....	9,061.80
Total.....	562,350.25

TABLE No. 10.—*Detail of material and supplies.*

Balboa store.....	\$4,017,836.54	
Cristobal store.....	608,183.97	
Paraiso store.....	935,515.86	
Medical store.....	88,717.49	
Fuel oil.....	273,473.73	
Stationery store, administration building.....	15,532.35	
Printing plant store.....	80,580.17	
District quartermaster store:		
Cristobal.....	\$1,171.90	
Gatun.....	21,138.52	
Paraiso.....	1,882.60	
Balboa-Ancon.....	4,951.57	
		29,144.59
Total, quartermaster stores.....		\$6,048,984.70
Material on hand with divisions, not yet charged to the work.....		614,474.29
Containers in transit.....		65,814.37
Obsolete store (credited to assets).....		217,110.25
Total.....		6,946,383.61

TABLE No. 11.—*Detail of assets received from the Canal Zone government.*

	Amount.
School buildings.....	\$72,115.00
Roads.....	451,887.50
Waterworks and sewer system.....	18,500.00
Stationery stock.....	2,167.04
Miscellaneous.....	122.83
Total.....	544,792.37

TABLE No. 12.—*Detail of assets transferred to other departments of the United States Government.*

	Amount.
To Army on Canal Zone:	
Buildings—	
Corozal.....	\$206,552.25
Cristobal.....	22,261.51
Culebra.....	244,586.41
Empire.....	368,606.67
Gatun.....	28,553.91
Las Cascades.....	126,416.00
Margarita Island.....	375.50
Toro Point.....	24,076.24
	\$1,021,428.41
Roads.....	249,200.00
Waterworks and sewer system.....	361,550.00
To State Department, legation building, city of Panama.....	22,256.00
To Alaskan Engineering Commission.....	168,079.63
Total.....	1,822,514.12

TABLE No. 13.—*Detail of Panama Canal property operated by Panama Railroad.*

	Amount.
Floating equipment.....	\$109,227.77
Rolling stock.....	753,834.76
Machinery.....	10,913.41
Docks, wooden:	
Cristobal.....	\$62,000.00
Balboa.....	8,100.00
	70,100.00
Steamships:	
Colon.....	400,000.00
Panama.....	400,000.00
Caribbean.....	156,304.60
	956,304.60
Total.....	1,900,380.54

TABLE No. 14.—*Detail of Panama Railroad property operated by Panama Canal.*

	Amount.
Buildings.....	\$328,838.50
Floating equipment.....	38,585.00
Rolling stock.....	50,290.32
Machinery.....	10,655.00
Gamboa gravel plant.....	79,961.28
Concrete dock, Balboa.....	373,742.10
Total.....	\$82,072.20

TABLE No. 15.—*Detail of reserves.*

			Amount.
For gratuity.....			\$784,973.70
For depreciation:			
Structures—			
Shop buildings.....	\$20,267.02		
Power system.....	259,028.70		
Docks and piers.....	15,572.59		
Waterworks systems.....	36,863.13		
Storehouses.....	29,660.12		
Balboa dry dock.....	30,000.00		
		\$391,391.56	
Equipment and tools—			
Mechanical division.....	33,272.00		
Storehouses.....	11,290.10		
Dredging division.....	1,194,546.89		
Fortifications division.....	3,383.94		
Building division.....	426.99		
Terminal division.....	8,106.65		
Corrals.....	53,911.05		
Marine division.....	34,441.47		
Gatun locks division.....	¹ 423.97		
Pacific locks division.....	¹ 3,813.99		
Balboa power house.....	30,607.34		
Electrical division.....	6,050.80		
Health department.....	22,510.10		
Colon breakwater.....	8.85		
Gamboa gravel plant.....	16,251.40		
Fuel-oil plants.....	49,500.00		
Contractors.....	¹ 916.19		
		1,461,985.81	
			1,853,377.37
For repairs:			
Structures—			
Balboa shops buildings.....	18,804.48		
Storehouses.....	11,979.99		
Power system.....	11,717.51		
Cristobal roundhouse.....	985.33		
Fuel-oil plants.....	45,987.01		
		89,474.32	
Equipment—			
Mechanical division.....	72,569.11		
Storehouses.....	16,735.11		
Dredging division.....	208,213.80		
Marine division.....	10,107.81		
Pacific locks division.....	¹ 586.18		
Motor cars.....	2,218.28		
Locomotives.....	912.27		
Cranes, lock operation.....	586.18		
		310,756.38	
			400,230.70
For loss on sales of obsolete stock.....			153,000.00
Total.....			3,191,581.77

¹ Debit balance.

TABLE No. 16.—*Construction of canal, fiscal year 1917 and to June 30, 1917.*

[Amounts include canal overhead.]

	Fiscal year 1917.	To June 30, 1917.
CANAL CONSTRUCTION.		
Prism excavation:		
Gatun to sea.....		\$11,932,801.89
Gatun to Pedro Miguel (Table No. 27).....	\$430,089.34	107,426,305.88
Pedro Miguel to sea (Table No. 27).....	177,448.64	17,919,351.40
Total prism excavation.....	607,537.98	137,278,459.17
Gatun locks.....	580.83	35,666,843.55
Pedro Miguel lock.....	13,079.44	15,611,654.92
Miraflores locks.....	12,566.36	22,963,975.55
Gatun spillway.....		4,101,671.11
Miraflores spillway and east dam.....		1,326,906.40
Gatun dam.....		9,871,635.81
Gatun-Mindilevee.....		141,329.45
Trinidad River dam.....		66,713.27
Pedro Miguel dams.....		433,835.38
Miraflores west dam.....		1,165,516.74
La Boca locks and dams—abandoned.....		751,748.32
Colon east breakwater (Table No. 17).....	431,817.09	3,797,560.65
Colon west breakwater.....		4,291,747.21
Naos Island breakwater.....		1,020,666.41
Aids to navigation.....	24,605.20	650,139.87
Total canal.....	1,090,186.95	239,140,403.81
AUXILIARY WORKS.		
Power-producing and transmitting system (Table No. 24):		
Gatun hydroelectric plant.....	177,203.35	1,008,895.25
Miraflores steam-electric plant.....	11,835.78	307,485.78
Power transmission system.....	82,610.95	3,481,241.69
Total power producing and transmitting system.....	271,650.08	4,797,622.72
Pacific terminals (Table No. 20):		
Coaling station.....	292,940.58	2,234,557.77
Fuel-oil plant.....	30,617.47	372,004.84
Dry dock.....	370,771.48	3,533,954.63
Docks.....	182,276.66	3,108,137.61
Dredging inner harbor.....	451,171.19	2,241,581.53
Entrance basin.....		489,480.39
Preparatory work.....	186,001.83	1,756,349.50
Total Pacific terminals.....	1,513,779.21	13,736,366.27
Atlantic terminals (Table No. 19):		
Coaling station.....	1,454,996.61	3,551,831.69
Fuel-oil plant.....	22,453.14	231,156.43
Dry dock.....		67,626.16
Docks.....	584,937.99	584,937.99
Total Atlantic terminals.....	152,394.52	4,435,552.27
Gatun dock.....		8,951.33
Permanent town sites (Table No. 21):		
Cristobal.....	22,921.97	86,106.24
Colon Beach.....	212,302.07	212,302.07
Gatun.....	3,374.55	21,175.31
Pedro Miguel.....	15,572.69	174,856.63
Red Tank.....	19,825.93	19,825.93
Balboa-Ancon.....	197,402.73	1,613,499.16
La Boca.....		192,562.94
Total permanent town sites.....	471,399.94	2,320,323.23
Buildings (Table No. 22):		
Designing and preliminary expenses.....	17,077.27	32,887.02
Offices—		
Administration, Balboa.....	142.03	1,203,601.01
Administration, Santa Rosa.....	135.45	130,592.39
Balboa shops.....	2,493.94	238,553.94
Balboa terminals.....	2,980.18	80,634.42
Shops—		
Balboa.....	255,146.59	3,996,426.84
Paraiso.....	12,800.00	
Cristobal.....	29,446.43	133,245.31
Cristobal roundhouse.....	4,695.68	46,357.41
Storehouses.....	300,291.49	1,091,507.10
Hotels and mess halls.....	229,055.44	495,351.19

¹ Indicates credit.

TABLE NO. 16.—*Construction of canal, etc.*—Continued.

	Fiscal year 1917.	To June 30, 1917.
Buildings (Table No. 22)—Continued.		
Gold quarters.....	\$1, 168, 045. 73	\$4, 606, 054. 80
Silver quarters.....	205, 684. 56	591, 927. 99
Ancon Hospital.....	347, 272. 85	546, 153. 64
Colon Hospital.....	15, 635. 17	210, 179. 41
Dispensaries.....	90, 610. 61	109, 648. 77
Asylums.....	15, 929. 97	186, 541. 76
Quarantine stations.....		72, 469. 36
Medical storehouses.....		25, 471. 15
Miscellaneous buildings, health department.....	27, 129. 28	29, 454. 42
Post offices.....		35, 982. 62
Schoolhouses.....	379, 436. 58	454, 396. 98
Courthouses, police stations, jails, etc.....		90, 454. 10
Fluviographs.....		13, 709. 02
Miscellaneous buildings.....	127, 200. 87	371, 830. 53
Total buildings.....	3, 215, 610. 12	14, 793, 731. 18
Playgrounds, including Balboa grand stand.....	45, 207. 98	45, 207. 98
Sanitary fills:		
La Boca.....	3, 692. 96	3, 692. 96
Ancon-Balboa.....		154, 366. 20
Balboa wye.....		132, 121. 74
Ancon-Corozal Road.....	35, 412. 50	35, 412. 50
Miraflores power house.....		19, 736. 20
Pedro Miguel.....		69, 130. 46
Mount Hope.....	161, 696. 53	187, 003. 61
Total sanitary fills.....	200, 801. 99	601, 463. 67
Sanitary ditches.....	99, 299. 61	99, 299. 61
Waterworks systems:		
Colon-Cristobal.....		585, 642. 89
Panama-Gamboa.....	1, 171. 41	1, 765, 222. 58
Gatun.....	16, 785. 96	257, 785. 96
Other Zone systems.....	1 2, 266. 58	311, 044. 30
Total waterworks systems.....	15, 690. 79	2, 919, 695. 73
Zone sewage system.....	68. 35	68, 466. 41
Zone roadways.....	123, 036. 69	754, 353. 40
Real estate:		
For canal construction and flooded areas.....	13, 575. 50	879, 583. 06
For auxiliary works and buildings.....	150. 00	146, 258. 94
For depopulation of the Canal Zone.....	493, 249. 51	1, 441, 864. 20
Total real estate.....	506, 975. 01	2, 467, 706. 20
Miscellaneous:		
Gravel reclaiming plant, Gamboa.....	1 14, 267. 84	1 1, 168. 96
Relocation Panama Railroad.....		9, 800, 623. 46
Investment Panama Railroad stock.....		155, 818. 24
Concession from Republic of Panama.....		10, 000, 000. 00
Purchases from New Panama Canal Co.....	1 17, 184. 46	38, 733, 388. 41
Total miscellaneous.....	1 31, 452. 30	58, 688, 664. 15
Total construction of canal.....	7, 674, 648. 94	344, 877, 813. 01

¹ Indicates credit.TABLE NO. 17.—*Detailed cost, Colon east breakwater, fiscal year 1917 and to June 30, 1917.*

	Fiscal year 1917.	To June 30, 1917.
Trestle construction.....	\$5, 719. 17	\$582, 239. 00
Trestle reconstruction.....	1 2, 584. 60	186, 526. 50
Dry filling:		
Plowing off Lidgerwood cars.....	2, 488. 87	756, 778. 83
Placing with derrick barges.....		351. 29
Placing concrete blocks.....	367, 946. 69	808, 522. 12
Scow fill from Gaillard Cut.....		616. 47
Scow fill from Cristobal coaling plant.....	946. 08	946. 08
Hydraulic filling.....		318, 566. 77
Plant.....	18, 044. 76	538, 299. 98
Total division cost Colon east breakwater.....	392, 560. 97	3, 192, 847. 04

¹ Indicates credit.

TABLE NO. 18.—Detailed cost, Pier No. 6, Cristobal, to June 30, 1917.

	Quantity.	Amount.	Unit cost.
Surveys.....		\$3,614.30	
Designing.....		10,828.21	
Preliminary borings.....linear feet..	2,924.6	1,514.78	\$0.5180
Final borings.....do.....	6,603	2,496.69	.3784
Preparing site.....		5,892.98	
Preliminary work.....		49,173.22	
Dredging.....cubic yards..	243,198	15,273.89	.0628
Maintenance range lights.....		37.89	
Caissons, 6 feet diameter.....linear feet..	15,855	277,273.71	17.4800
Excavating inside caissons.....cubic yards..	10,307.39	56,094.68	5.4367
Concrete in caissons.....do.....	10,987	61,823.27	5.6250
Trusses.....		353.58	
Placing concrete.....		83.76	
Concrete slab.....		81.33	
Plant—balance to be absorbed.....		5,299.82	
Total division cost, Pier No. 6.....		489,842.11	

TABLE NO. 19.—Detailed cost, Atlantic terminals, fiscal year 1917 and to June 30, 1917.

	Fiscal year 1917.	To June 30, 1917
COALING PLANT.		
Preliminary and general work.....	\$14,451.80	\$177,963.68
Foundations:		
Retaining-wall construction.....	171.38	110,376.98
Caisson construction.....	1,410.94	647,178.27
Total foundations.....	1,582.32	757,555.25
Backfilling.....	24.05	32,518.20
Floors.....	2,517.05	476,805.36
Superstructure:		
Stocking and reclaiming bridges.....	69,114.43	495,600.91
Unloader towers.....	55,076.94	368,465.38
Reloader towers.....	39,016.13	237,004.83
Conveyor system.....	114,890.19	597,522.86
Total superstructure.....	278,097.69	1,698,593.98
Accessories.....	115.89	7,452.29
Miscellaneous.....	15,954.10	137,988.51
Plant.....		11,431.76
Total division cost, coaling plant.....	312,611.12	3,277,445.51
Dredging.....	83,419.75	719,565.48
Total division cost, coaling plant, including dredging.....	396,030.87	3,997,010.99
Less Panama Railroad Company's proportion (\$475,000 has been paid).....	1875,000.00	1875,000.00
Net division cost, coaling plant.....	1478,969.13	3,122,010.99
FUEL-OIL HANDLING PLANT.		
Storage:		
United States tanks Nos. 1 and 2.....		51,928.55
United States tank No. 9.....	20,809.74	23,054.16
Total storage.....	20,809.74	74,982.71
Oil-pump plant.....		71,987.09
Oil docks.....		243.15
Pipe lines.....	1403.32	43,457.45
Total division cost, oil-fuel storage.....	20,406.42	190,670.40
Gasoline storage: United States tank No. 27.....	5.53	12,704.07
Total division cost, fuel-oil handling plant.....	20,411.95	203,374.47
Dry dock.....		67,387.42
Pier No. 6.....	489,842.11	489,842.11
Boathouse, between Piers Nos. 7 and 8.....	41,919.70	41,919.70
Cristobal shops.....	26,769.49	127,975.36
Cristobal roundhouse.....	4,208.72	45,441.89
Total division cost, Atlantic terminals.....	104,242.91	4,097,951.94

† Indicates credit.

TABLE NO. 20.—Detailed cost, Pacific terminals, fiscal year 1917 and to June 30, 1917.

	Fiscal year 1917.	To June 30, 1917.
PREPARING SITES, GENERAL.		
Preliminary and general work.....	\$72,041.48	\$416,157.71
Preparing site.....	9,010.12	734,904.69
Curundu River drainage culvert.....		41,137.01
Cofferdam, construction.....	¹ 58,970.29	58,970.29
Cofferdam, dredging.....	78,191.18	78,191.18
Plant.....	² 49,120.49	73,105.71
Total division cost, preliminary work, and preparing site.....	169,092.58	1,402,466.59
Dredging inner harbor—total division cost (Table No. 28).....	360,419.23	1,578,363.58
Reclaiming land—total division cost (Table No. 28).....	49,736.40	330,968.51
Entrance basin dry excavation—total division cost.....		380,988.19
MAIN DRY DOCK.		
Preliminary and general work.....	10,844.99	142,902.05
Dry excavation.....		585,686.56
Preparing foundations.....	3,971.49	89,861.29
Concrete masonry, mass.....	3,533.05	585,107.72
Concrete masonry, reinforced.....	6,148.25	292,266.28
Granite.....		36,069.35
Pumping plant.....	39,416.54	179,235.20
Miter gates—original cost of gates and operating machinery.....		132,147.15
Erection of gates.....	² 19,386.82	111,097.25
Installation miter-gate machinery.....	340.77	5,437.06
Miter-gate anchorage.....		337.24
Back filling.....	1,846.04	62,006.16
Miscellaneous.....	275,699.87	571,052.58
Total division cost, main dry dock.....	322,414.18	2,793,205.89
ENTRANCE PIER.		
Preliminary and general work.....	3,707.66	15,588.54
Dry excavation.....		72,544.90
Preparing foundation.....		22,764.84
Concrete masonry, mass.....	69.20	80,065.00
Concrete masonry, reinforced.....	264.33	23,972.10
Backfilling.....		127.65
Miscellaneous.....	10,609.61	78,818.94
Total division cost, entrance pier.....	14,650.80	293,881.97
Total division cost main dry dock and entrance pier.....	337,064.98	3,087,087.86
COALING PLANT.		
Preliminary and general work.....	2,030.74	46,667.64
Coal-storage area:		
Dry excavation.....		144,909.98
Preparing foundations.....		7,674.40
Concrete masonry.....	1,048.29	61,362.86
Backfilling.....	400.81	24,856.39
Grading floor.....	599.02	10,900.63
Miscellaneous.....	2,000.81	3,636.52
Total division cost, coal-storage area.....	4,048.93	253,340.78
Coal-handling plant:		
Foundations for stocking and reclaiming cranes.....	1,102.67	69,477.24
Erection of stocking and reclaiming cranes.....	22,403.25	158,471.53
Unloader towers.....	24,644.60	178,500.91
Reloader towers.....	44,612.16	108,866.06
Conveyor system.....	134,446.89	354,083.72
Miscellaneous.....	7,457.35	8,568.51
Total division cost, coal-handling plant.....	234,666.92	878,267.97
SEA WALL AND UNLOADER WHARF.		
Preliminary and general work.....	4,595.97	13,723.03
Dry excavation.....	55.93	121,465.23
Preparing foundation.....		15,943.43
Substructure.....	49.69	4,865.55
Concrete masonry, mass.....		95,871.57
Concrete masonry, reinforced.....	530.66	26,351.23
Miscellaneous.....	6,493.04	105,807.40
Total division cost, sea wall and unloader wharf.....	11,725.29	384,027.44

¹ Adjustment of operations prior to July 1, 1916.² Indicates credit.

TABLE No. 20.—Detailed cost, Pacific terminals, etc.—Continued.

	Fiscal year 1917.	To June 30, 1917.
RELOADER WHARF.		
Preliminary and general work.....	\$6,473.05	\$65,192.01
Substructure.....	¹ 223.96	157,907.82
Superstructure.....	952.63	131,650.47
Filling.....	6,119.87	15,940.43
Miscellaneous.....	13,197.54	99,259.96
Total division cost, reloader wharf.....	26,519.13	469,950.69
Total division cost, coaling station.....	278,991.01	2,032,254.52
PERMANENT SHOPS.		
Miscellaneous.....	35,642.47	622,721.74
Steel erection.....		34,508.77
Machine and erection shop.....	63,748.50	687,633.85
Forge shop.....	9,853.48	224,722.28
Steel storage shed.....	1,231.68	116,342.69
Boiler and ship-fitters' shop.....	14,698.97	235,314.09
Paint shop.....	1,350.71	57,216.79
Car shop.....	4,157.95	101,198.70
Planing mill.....	2,238.99	194,748.13
Galvanizing building.....	21,829.67	77,349.11
Lumber and equipment shed.....	797.25	116,877.23
Pattern storage room.....		57,933.65
Foundry.....	9,134.44	263,091.05
Coke shed.....		10,208.63
Boiler house.....	1,748.92	26,206.65
Roundhouse.....	18,938.70	173,593.06
Gas house.....	19,178.90	39,360.37
Toilets.....	3,293.30	86,148.21
Paint house.....		10,753.73
Main office.....	2,267.22	200,413.92
Sand house.....		12,395.81
Lye house.....		2,592.65
Compressor plant and pump house.....	15,903.07	168,340.95
Ice-storage house.....		656.80
New pattern storage.....	4,747.17	4,747.17
Tool-storage house.....	594.88	594.88
Shop tunnel.....	736.38	156,349.54
Total division cost, permanent shops.....	232,092.65	3,682,070.45
DOCKS.		
Quay wall, north of concrete dock.....	1,364.73	444,038.29
Quay wall, south of concrete dock.....	55,434.59	532,336.81
Bulkhead quay wall, between wharf and Pier No. 18.....	8,186.79	228,071.13
Pier No. 18 (old No. 1).....	76,743.91	1,105,143.25
Concrete lumber wharf.....	¹ 954.54	255,667.79
Electrical installation.....	5,035.77	13,002.29
Water mains.....		7,162.62
Air mains.....		3,389.93
Rat proofing.....	19,894.79	19,894.79
Total division cost, all docks.....	165,706.04	2,608,706.90
FUEL-OIL HANDLING PLANT.		
Storage:		
United States tanks Nos. 3 and 4.....		46,983.00
United States tank No. 5.....	15,387.60	25,991.63
United States tank No. 62.....	2,083.57	2,083.57
Tank farm.....	109.85	15,256.87
Total division cost, storage.....	17,581.02	90,315.07
Oil-pump plant.....	1,011.90	75,337.49
Oil docks.....	155.63	59,079.28
Pipe lines.....	5,128.84	79,428.42
Dredging berth for ships.....		7,933.40
Total division cost, oil-fuel storage.....	23,877.39	312,093.66
Gasoline storage: United States tank No. 31.....	3,956.67	15,445.65
Total division cost, fuel-oil handling plant.....	27,834.06	327,539.31
Total division cost, Pacific terminals ²	1,620,936.93	15,430,445.91

¹ Indicates credit.² General storehouse, Balboa, and Balboa terminal office building not included in these totals.

TABLE No. 21.—Detailed cost, permanent town sites, to June 30, 1917.

Item.	La Boca.	Balboa.	Pedro Miguel.	Red Tank.	Gatun.	Cristobal.	Colon Beach.
Preliminary and general work.....	\$37,557.50	\$176,171.18	\$40,627.32	.....	.....	.....	\$73,492.12
Preliminary maintenance.....	.....	10,519.78	.....	.....	.....	.....	.....
Road construction.....	31,869.40	362,683.61	20,777.72	\$10,009.33	.....	.....	32,483.96
Drainage.....	14,842.53	7,903.21	22,488.65	.....	.....	.....	.....
Waterworks.....	20,779.72	53,622.87	19,597.24	2,118.70	.....	.....	9,451.02
Sewer system.....	26,328.15	186,925.43	11,572.72	2,059.46	.....	.....	60,180.95
Walks.....	6,084.34	58,370.86	281.62	1,410.38	.....	.....	7,194.21
Balboa nursery.....	.....	1,576.79	.....	.....	.....	.....	.....
Lot improvements.....	.....	253,191.02	.....	736.49	\$3.75	.....	6,088.12
Street lighting.....	.....	32,717.76	11,908.33	498.20	4,892.46	\$5,839.72	5.63
Underground duct system.....	.....	.....	.....	.....	.....	.....	.....
Improvements, block A.....	10,221.73	.....	3,267.45	.....	14,074.34	72,387.34	.....
Division expense.....	4,440.38	47,272.34	3,128.87	1,191.00	.....	.....	4,155.87
Total division cost.....	152,123.75	1,375,654.52	133,649.92	18,023.56	18,970.55	78,227.06	193,001.88

TABLE 22.—Detail of "Buildings," fiscal year 1917 and to June 30, 1917.

	Fiscal year 1917.	To June 30, 1917.
Designing and preliminary expenses, new buildings.....	\$15,524.78	\$31,604.40
Administration building, Balboa Heights.....	129.12	932,544.28
Administration building, Santa Rosa.....	123.14	128,083.99
Paraiso shops, appraisal of old buildings.....	¹ 2,800.00	.....
Storehouses:		
General storehouse, Balboa.....	\$2,936.06	\$294,615.32
Lumber storehouse, Balboa.....	115,953.94	115,953.94
Paint storehouse, Balboa.....	27,882.85	27,882.85
Oil storehouse, Balboa.....	.....	31,067.22
Forage storehouse.....	.....	6,140.66
Explosives storehouse.....	.....	461.14
Dredge-parts storehouse.....	333.04	5,053.36
Oil storehouse, Cristobal.....	.....	5,800.00
Electrical storehouse, Balboa.....	79,297.93	81,454.72
Electrical storehouse, Gatun.....	41.00	1,952.50
General storehouse, Cristobal.....	42,343.88	42,343.88
Dynamite storehouse, Gamboa.....	3,938.69	3,938.69
Fuse storehouse, Gamboa.....	1,673.97	1,673.97
Appraisal of old buildings.....	.....	86,357.07
	274,401.36	704,695.32
Hotels and mess halls:		
Hotel Aspinwall landing stage.....	.....	1,897.34
Cristobal Hotel.....	69,323.82	74,128.13
Gatun mess hall.....	4,117.06	5,876.19
La Boca mess hall.....	.....	7,386.39
La Boca kitchen.....	.....	2,606.67
Balboa Hotel.....	70,014.96	70,014.96
Ancon Hotel.....	58,336.34	58,336.34
Camp Bierd, mess hall and kitchen.....	6,440.04	6,440.04
Appraisal of old buildings.....	.....	245,443.00
	208,232.22	472,129.06
Gold quarters:		
Four-family concrete quarters.....	107,090.36	1,173,185.09
Two-family concrete quarters.....	.....	177,536.86
Bachelor concrete quarters.....	¹ 212.83	68,926.42
New wooden quarters.....	942,306.25	1,129,412.06
Reerected wooden quarters.....	12,794.37	251,327.62
Appraisal of old buildings.....	559.75	1,381,574.84
	1,062,537.90	4,181,962.89
Silver quarters:		
New wooden quarters.....	181,593.08	223,923.45
Reerected wooden quarters.....	2,594.54	198,653.82
Appraisal of old buildings.....	.....	136,837.97
Alterations and repairs of old buildings.....	2,798.35	2,798.35
	186,985.97	562,213.59
Hospitals:		
Colon Hospital.....	14,213.78	190,831.44
Ancon Hospital.....	315,702.60	496,503.30
	329,916.38	687,334.74
Dispensaries:		
Balboa dispensary.....	.....	16,677.79
Ancon dispensary.....	59,338.99	59,338.99
Pedro Miguel dispensary.....	23,034.50	23,334.30
	82,373.29	99,351.08

¹ Indicates credit.

TABLE 22.—Detail of "Buildings," etc.—Continued.

	Fiscal year 1917.		To June 30, 1917.	
Asylums:				
Corozal asylum building.....			\$72,782.28	
Dairy shed.....			23,562.45	
Dairy building.....			12,546.53	
Hog shed.....			13,333.49	
Guinea-pig house.....	\$5,095.61		311.79	
Chicken house.....	1,589.19		1,589.19	
Compost pit.....	14.47		552.22	
Palo Seco building.....	7,470.73		45,396.19	
		\$14,481.79		\$170,074.14
Quarantine stations:				
Balboa quarantine station.....			38,756.88	
Balboa quarantine landing.....			26,078.40	
				64,835.28
Medical storehouse, Ancon.....				22,393.93
Health department, miscellaneous:				
Garage, Colon Hospital.....	6,212.01		6,212.01	
Kitchen, Colon quarantine station.....	666.55		666.55	
Dentists and sanitary inspectors' offices and quarters.....	17,784.42		17,784.42	
Corozal Cemetery.....			2,113.77	
		24,662.98		26,776.75
Post offices:				
Corozal.....			1,592.62	
Appraisal of old buildings.....			34,390.00	
				35,982.62
Schoolhouses:				
Concrete white school, Balboa.....	133,091.23		133,425.67	
Manual-training school, Balboa.....			4,611.85	
Concrete white school, Ancon.....	63,705.36		63,705.36	
Concrete white school, Pedro Miguel.....	32,881.23		32,881.23	
Concrete white school, Gatun.....	34,974.04		34,974.04	
Concrete white school, Cristobal.....	84,513.21		84,753.65	
Colored school, Pedro Miguel.....	2,050.00		2,050.00	
Appraisal of old buildings.....	16,900.00		62,615.00	
		344,315.07		419,016.80
Courthouses, fire and police stations, etc.:				
La Boca fire station.....			280.22	
Balboa fire station.....			18,335.31	
Balboa police station.....			11,190.59	
Appraisal of old buildings.....			60,635.44	
				90,441.56
Fluviographs.....				11,534.38
Terminal office building, Balboa.....		2,709.25		73,304.01
Miscellaneous buildings:				
Clubhouses—				
Balboa.....			17,481.20	
La Boca, silver employees.....			3,989.62	
La Boca, annex.....	3,500.00		3,500.00	
Pedro Miguel.....			19,695.77	
Paraiso.....	16,001.57		16,001.57	
Gatun, silver employees.....			1,500.00	
Cristobal.....			16,000.00	
		19,501.57		78,168.16
Balboa motor-car houses.....				11,448.16
Motor-truck garage, Ancon corral.....		19,493.04		19,493.04
Garages:				
Ancon-Balboa district.....	5,766.85		28,199.63	
Pedro Miguel district.....	4,820.56		4,820.56	
Gatun.....	2,411.85		2,411.85	
Cristobal.....			817.18	
Colon.....	1,567.59		1,567.59	
		14,566.85		37,816.81
Office and storeroom, Ancon.....				1,035.04
Office and storeroom, Pedro Miguel.....				311.56
Office, store, and shop, district quartermaster, Balboa Heights.....		1,499.79		16,684.12
Anemometer tower, Balboa Heights.....				1,747.69
Boathouses, Marine division:				
Colon, Piers Nos. 1 and 2.....			1,887.41	
Balboa, Pier No. 18.....			1,656.48	
				3,543.89
Five small buildings.....				845.17
La Boca lodge hall.....				1,689.23
Three toilets, Gatun locks.....	3,888.88			3,888.88
Incinerator, Gavilan Island.....	11,031.64			11,031.64
Balboa shops, mess hall, and pattern shop.....	46,372.33			46,372.33
Appraisal of old buildings.....				112,207.26
Total, buildings.....		2,659,947.35		9,060,561.80

¹ Indicates credit.

TABLE No. 23.—*Cost to June 30, 1917, of quarters completed during the fiscal year 1917.*

	Number.	Amount.	Unit cost.
One-family, type 17, frame:			
Ancon-Balboa district.....	100	\$246,052.31	\$2,460.52
Pedro Miguel.....	16	35,467.73	2,216.73
Four-family, type 14, frame:			
Balboa.....	74	464,606.30	6,278.46
Pedro Miguel.....	12	68,762.01	5,730.17
Four-family, concrete, Balboa.....	4	99,016.51	24,754.13
Twelve-family, frame, silver:			
Pedro Miguel.....	20	111,015.15	5,550.76
Gamboa.....	6	32,199.85	5,366.64
Monte Lirio.....	2	12,490.39	6,245.20
Washhouses:			
Pedro Miguel.....	7	4,438.84	634.12
Gamboa.....	2	1,140.46	570.23
Total.....		1,075,189.55	

TABLE 24.—*Detailed cost power producing and transmitting system, fiscal year 1917 and to June 30, 1917.*

	Fiscal year 1917.	To June 30, 1917.
Gatun hydroelectric power plant:		
Excavation.....		\$54,862.07
Building.....	\$104,567.08	389,534.83
Operating machinery.....	56,526.87	371,845.26
Total division cost.....	161,093.95	816,242.16
Miraflores steam-electric power plant:		
Building and site.....		233,629.74
Operating machinery.....	10,759.80	27,448.90
Total division cost.....	10,759.80	261,078.64
Power transmission system:		
Transformer substations—		
Cristobal.....	7,413.18	297,442.74
Gatun.....	57,182.65	371,963.18
Gamboa.....		23,775.03
Miraflores.....		337,331.57
Balboa.....		282,149.03
Transmission line.....		1,082,815.92
Duct lines.....	8,466.07	358,297.65
Distribution lines.....	2,038.96	58,803.19
Total division cost.....	75,100.86	2,812,578.31
Total division cost, power producing and transmission system.....	246,954.61	3,889,899.11

TABLE No. 25.—*Detailed statement of classified expenditures in health department from the beginning of the work to June 30, 1915.*

Administration.....	\$899,223.30
Hospitals and asylums:	
Medical storehouse.....	52,793.87
Ancon Hospital.....	4,194,141.79
Colon Hospital.....	1,995,294.75
Taboga Sanitarium.....	131,428.43
Santo Tomas Hospital.....	83,579.69
Other hospitals, dispensaries, and sick camps.....	2,247,573.87
Quarantine.....	440,349.73
Sanitation, Panama.....	880,988.26
Sanitation, Colon.....	658,635.64
Street cleaning and garbage disposal, Panama.....	105,936.83
Street cleaning and garbage disposal, Colon.....	58,179.48
Zone sanitation.....	4,359,687.93
Street cleaning and garbage disposal, Zone.....	553,809.73
Construction of buildings.....	1,037,745.06
Repairs of buildings.....	125,594.40
Corozal farm.....	28,296.93
Total.....	17,853,259.69

TABLE No. 26.—*Detailed statement of classified expenditures in department of civil administration from the beginning of the work to June 30, 1915.*

Administration.....	\$665,868.82
Supreme and circuit courts.....	396,429.00
Prosecuting attorney.....	39,558.47
District court (new).....	20,345.51
District attorney.....	11,077.75
Canal Zone marshal.....	9,684.13
Division of revenues.....	196,019.21
Division of posts.....	918,271.91
Division of customs.....	107,952.54
Division of lands and buildings.....	108,172.17
Division of estates.....	36,016.14
Police and prisons.....	2,719,055.42
Fire protection.....	966,645.25
Miscellaneous Zone public works.....	34,825.14
Treasurer of Canal Zone.....	52,944.05
Construction of buildings.....	549,595.17
Repairs of buildings.....	28,745.75
Survey of lands, Canal Zone.....	75,000.00
Special attorney.....	9,206.03
Total.....	6,945,412.46

TABLE No. 27.—*Dredging excavation—Detailed cost per unit of work, fiscal year 1917.*

GAILLARD CUT—CONSTRUCTION.

Item.	Quantities.	Unit cost.
	<i>Cubic yards.</i>	
Operation, small ladder dredges.....	30,123	\$0.2534
Repairs, small ladder dredges.....	30,123	.1672
Depreciation, small ladder dredges.....	30,123	.0133
Operation, 3-yard ladder dredges.....	73,805	.1158
Repairs, 3-yard ladder dredges.....	73,805	.1520
Depreciation, 3-yard ladder dredges.....	73,805	.0510
Operation, large dipper dredges.....	877,613	.0436
Repairs, large dipper dredges.....	877,613	.0473
Depreciation, large dipper dredges.....	877,613	.0195
Operation, pipe-line dredges.....	98,564	.0632
Repairs, pipe-line dredges.....	98,564	.0316
Depreciation, pipe-line dredges.....	98,564	.0064
Operation, tugs, clapnets, and scows.....	981,541	.0739
Repairs, tugs, clapnets, and scows.....	981,541	.0598
Depreciation, tugs, clapnets, and scows.....	981,541	.0220
Operation, drill barges.....	976,471	.0185
Repairs, drill barges.....	976,471	.0026
Depreciation, drill barges.....	976,471	.0011
Operation, hydraulic graders.....	1,080,105	.0010
Repairs, hydraulic graders.....	1,080,105	.0001
Depreciation, hydraulic graders.....	1,080,105	.0002
Operation, rock breaker.....	976,471	.0006
Repairs, rock breaker.....	976,471	.0004
Depreciation, rock breaker.....	976,471	.0001
Operation, miscellaneous floating equipment.....	1,080,105	.0071
Repairs, miscellaneous floating equipment.....	1,080,105	.0004
Depreciation, miscellaneous floating equipment.....	1,080,105	.0001
Drilling.....	976,471	.0084
Blasting.....	976,471	.0015
Pipe lines.....	98,564	.0104
Operation, relay pumps.....	98,564	.0208
Repairs, relay pumps.....	98,564	.0003
Channel lights.....	1,080,105	.0004
Division expense.....	1,080,105	.0327
Total division cost.....	1,080,105	.3525
Earth excavated.....	per cent..	103,634
Rock excavated.....	do.....	976,471
Rehandled yardage not credited to excavation: Small ladder dredges.....	do.....	94,180

TABLE No. 27.—*Dredging excavation—Detailed cost per unit of work, fiscal year 1917—Continued.*

MIRAFLORES LAKE—CONSTRUCTION.

Item.	Quantities.	Unit cost.
	<i>Cubic yards.</i>	
Operation, pipe-line suction dredges.....	246,998	\$0.0834
Repairs, pipe-line suction dredges.....	246,998	.0499
Depreciation, pipe-line suction dredges.....	246,998	.0050
Operation, miscellaneous floating equipment.....	246,998	.0001
Repairs, miscellaneous floating equipment.....	246,998	.0001
Pipe lines.....	246,998	.0009
Division expense.....	246,998	.0070
Total division cost.....	246,998	.1464
Earth excavation.....per cent.....	244,998	99.19
Rock excavation.....do.....	2,000	.81

PACIFIC ENTRANCE—CONSTRUCTION.

Operation, small ladder dredges.....	1,200	\$0.3910
Repairs, small ladder dredges.....	1,200	.3329
Depreciation, small ladder dredges.....	1,200	.0150
Operation, 3-yard ladder dredges.....	100,959	.1682
Repairs, 3-yard ladder dredges.....	100,959	.2048
Depreciation, 3-yard ladder dredges.....	100,959	.0646
Operation, large dipper dredges.....	118,979	.0829
Repairs, large dipper dredges.....	118,979	.0800
Depreciation, large dipper dredges.....	118,979	.0460
Operation, tugs, clapets, and scows.....	221,138	.0773
Repairs, tugs, clapets, and scows.....	221,138	.0593
Depreciation, tugs, clapets, and scows.....	221,138	.0189
Operation, drill barges.....	157,059	.0764
Repairs, drill barges.....	157,059	.0055
Depreciation, drill barges.....	157,059	.0030
Operation, rock breaker.....	157,059	.0065
Repairs, rock breaker.....	157,059	.0054
Depreciation, rock breaker.....	157,059	.0008
Operation, miscellaneous floating equipment.....	221,138	.0029
Repairs, miscellaneous floating equipment.....	221,138	.0004
Depreciation, miscellaneous floating equipment.....	221,138	.0002
Channel lights.....	221,138	.0003
Division expense.....	221,138	.0298
Total division cost.....	221,138	.5745
Earth excavation.....per cent.....	64,079	28.98
Rock excavation.....do.....	157,059	71.02

TABLE No. 28.—*Dredging excavation—Detailed cost per unit of work, fiscal year 1917.*

TERMINAL FACILITIES—BALBOA.

INNER HARBOR AND RECLAIMING LAND.

	Quantities.	Unit cost.
Dredging inner harbor:	<i>Cubic yards.</i>	
Operation, seagoing suction dredges.....	80,000	0.0427
Repairs, seagoing suction dredges.....	80,000	.0258
Depreciation, seagoing suction dredges.....	80,000	.0075
Operation, small ladder dredges.....	236,139	.0867
Repairs, small ladder dredges.....	236,139	.0420
Depreciation, small ladder dredges.....	236,139	.0038
Operation, 3-yard ladder dredges.....	201,119	.0966
Repairs, 3-yard ladder dredges.....	201,119	.1062
Depreciation, 3-yard ladder dredges.....	201,119	.0378
Operation, large dipper dredges.....	49,625	.1350
Repairs, large dipper dredges.....	49,625	.1180
Depreciation, large dipper dredges.....	49,625	.0770
Operation, pipe-line dredges.....	1,378,977	.0436
Repairs, pipe-line dredges.....	1,378,977	.0326
Depreciation, pipe-line dredges.....	1,378,977	.0029
Operation, tugs, clapets, and scows.....	486,883	.0697
Repairs, tugs, clapets, and scows.....	486,883	.0605
Depreciation, tugs, clapets, and scows.....	486,883	.0153
Operation, drill barges.....	77,030	.1099
Repairs, drill barges.....	77,030	.0222
Depreciation, drill barges.....	77,030	.0063
Operation, rock breakers.....	77,030	.0043
Repairs, rock breakers.....	77,030	.0032
Depreciation, rock breakers.....	77,030	.0005
Operation, miscellaneous floating equipment.....	1,945,860	.0027
Repairs, miscellaneous floating equipment.....	1,945,860	.0006
Depreciation, miscellaneous floating equipment.....	1,945,860	.0002
Drilling.....	77,030	.0363
Blasting.....	77,030	.0048
Pipe lines.....	1,378,977	.0183
Dikes.....	1,378,977	.0011
Channel lights.....	1,945,860	.0002
Division expense.....	1,945,860	.0155
Total division cost.....	1,945,860	.1852
Earth excavation..... per cent..	1,868,830	96.04
Rock excavation..... do.....	77,030	3.96
Reclaiming land:		
Pipe lines.....	1,378,977	.0042
Dikes.....	1,378,977	.0025
Operation relay pumps.....	1,378,977	.0192
Repairs relay pumps.....	1,378,977	.0034
Installation of relay pump stations.....	1,378,977	.0037
Division expense.....	1,378,977	.0030
Total division cost.....	1,378,977	.0360

TABLE No. 29.—*Dredging excavations—Detailed cost per unit of work, fiscal year 1917.*

ATLANTIC ENTRANCE—OPERATION AND MAINTENANCE.

Item.	Quantities.	Unit cost.
	<i>Cubic yards.</i>	
Operation, seagoing suction dredges.....	135, 756	\$0. 0260
Repairs, seagoing suction dredges.....	135, 756	. 0156
Depreciation, seagoing suction dredges.....	135, 756	. 0133
Operation, pipe-line dredges.....	48, 148	. 0778
Repairs, pipe-line dredges.....	48, 148	. 0334
Depreciation, pipe-line dredges.....	48, 148	. 0056
Operation, miscellaneous floating equipment.....	183, 904	. 0075
Repairs, miscellaneous floating equipment.....	183, 904	. 0012
Depreciation, miscellaneous floating equipment.....	183, 904	. 0009
Pipe lines.....	48, 148	. 0015
Channel lights.....	183, 904	. 0005
Division expense.....	183, 904	. 0428
Total division cost.....	183, 904	. 1243
Earth excavation..... per cent..	183, 904	100. 00

GAILLARD CUT—OPERATION AND MAINTENANCE.

Operation, seagoing suction dredges.....	505, 791	\$0. 1370
Repairs, seagoing suction dredges.....	505, 791	. 0812
Depreciation, seagoing suction dredges.....	505, 791	. 0232
Operation, small ladder dredges.....	144, 847	. 1043
Repairs, small ladder dredges.....	144, 847	. 0628
Depreciation, small ladder dredges.....	144, 847	. 0058
Operation 3-yard ladder dredges.....	789, 557	. 0639
Repairs, 3-yard ladder dredges.....	789, 557	. 0723
Depreciation, 3-yard ladder dredges.....	789, 557	. 0261
Operation, small dipper dredges.....	61, 880	. 0670
Repairs, small dipper dredges.....	61, 880	. 0623
Depreciation, small dipper dredges.....	61, 880	. 0038
Operation, large dipper dredges.....	5, 647, 806	. 0400
Repairs, large dipper dredges.....	5, 647, 806	. 0427
Depreciation, large dipper dredges.....	5, 647, 806	. 0174
Operation, pipe-line suction dredges.....	999, 753	. 0875
Repairs, pipe-line suction dredges.....	999, 753	. 0495
Depreciation, pipe-line suction dredges.....	999, 753	. 0090
Operation, tugs, clapets, and scows.....	6, 714, 990	. 0667
Repairs, tugs, clapets, and scows.....	6, 714, 990	. 0589
Depreciation, tugs, clapets, and scows.....	6, 714, 990	. 0211
Operation, drill barges.....	6, 530, 505	. 0062
Repairs, drill barges.....	6, 530, 505	. 0008
Depreciation, drill barges.....	6, 530, 505	. 0004
Operation, hydraulic graders.....	8, 149, 634	. 0059
Repairs, hydraulic graders.....	8, 149, 634	. 0010
Depreciation, hydraulic graders.....	8, 149, 634	. 0006
Operation, miscellaneous floating equipment.....	8, 149, 634	. 0082
Repairs, miscellaneous floating equipment.....	8, 149, 634	. 0031
Depreciation, miscellaneous floating equipment.....	8, 149, 634	. 0008
Drilling.....	6, 530, 505	. 0156
Blasting.....	6, 530, 505	. 0050
Pipe lines.....	999, 753	. 0222
Operation, relay pumps.....	999, 753	. 0080
Repairs, relay pumps.....	999, 753	. 0047
Channel lights.....	8, 149, 634	. 0004
Sluicing.....	8, 149, 634	. 0002
Division expense.....	8, 149, 634	. 0307
Total division cost.....	8, 149, 634	. 3206
Earth excavation..... per cent..	1, 619, 129	19. 87
Rock excavation..... do.....	6, 530, 505	80. 13
Rehanded yardage not credited to excavation:		
Small ladder dredges.....	16, 075	.....
Pipe-line suction dredges.....	516, 064	.....
Material pumped into barges by pipe-line suction dredges.....	70, 900	.....

TABLE No. 29.—*Dredging excavations—Detailed cost per unit of work, fiscal year 1917—Continued.*

MIRAFLORES LAKE—OPERATION AND MAINTENANCE.

Item.	Quantities.	Unit cost.
	<i>Cubic yards.</i>	
Operation, pipe-line suction dredges.....	448,385	\$0.0994
Repairs, pipe-line suction dredges.....	448,385	.0672
Depreciation, pipe-line suction dredges.....	448,385	.0059
Operation, miscellaneous floating equipment.....	448,385	.0004
Repairs, miscellaneous floating equipment.....	448,385	.0001
Depreciation, miscellaneous floating equipment.....	448,365	.....
Pipe lines.....	448,385	.0033
Division expense.....	448,385	.0088
Total division cost.....	448,385	.1851
Earth excavation..... per cent..	448,385	100.00

PACIFIC ENTRANCE—OPERATION AND MAINTENANCE.

Operation, seagoing suction dredges.....	860,361	\$0.0408
Repairs, seagoing suction dredges.....	860,361	.0224
Depreciation, seagoing suction dredges.....	860,361	.0087
Operation, small ladder dredges.....	38,684	.0890
Repairs, small ladder dredges.....	38,684	.1124
Depreciation, small ladder dredges.....	38,684	.0045
Operation, 3-yard ladder dredges.....	56,207	.1587
Repairs, 3-yard ladder dredges.....	56,207	.1580
Depreciation, 3-yard ladder dredges.....	56,207	.0579
Operation, pipe-line suction dredges.....	23,174	.1749
Repairs, pipe-line suction dredges.....	23,174	.1063
Depreciation, pipe-line suction dredges.....	23,174	.0108
Operation, tugs, clapets, and scows.....	94,891	.0832
Repairs, tugs, clapets, and scows.....	94,891	.0475
Depreciation, tugs, clapets, and scows.....	94,891	.0145
Operation, hydraulic graders.....	978,426	.0093
Repairs, hydraulic graders.....	978,426	.0010
Depreciation, hydraulic graders.....	978,426	.0014
Operation, miscellaneous floating equipment.....	978,426	.0020
Repairs, miscellaneous floating equipment.....	978,426	.0003
Depreciation, miscellaneous floating equipment.....	978,426	.0002
Channel lights.....	978,426	.0002
Division expense.....	978,426	.0087
Total division cost.....	978,426	.1358
Earth excavation..... per cent..	953,411	97.44
Rock excavation..... do.....	25,015	2.56

TABLE No. 30.—*Panama Canal—Gambua gravel production—Detailed cost per unit of work, by months, fiscal year 1917.*

Item.	July.	August.	Septem-ber.	October.	Novem-ber.	Decem-ber.	January.	February.	March.	April.	May.	June.	Total.
Quantities.....cubic yards.....	23, 238	25, 450	12, 884	17, 268	22, 841	24, 413	18, 328	15, 413	21, 534	19, 961	22, 494	22, 756	246, 580
Unloading from barges.....	\$0. 0524	\$0. 0421	\$0. 0647	\$0. 0521	\$0. 0380	\$0. 0333	\$0. 0513	\$0. 0554	\$0. 0443	\$0. 0397	\$0. 0397	\$0. 0399	\$0. 0449
Switching.....	.0407	.0264	.0732	.0237	.0158	.0070	.0233	.0302	.0304	.0237	.0808	.0272	.0280
Storing.....	.0082	.0089	.0143	.0330	.0385	.0412	.0336	.0409	.0286	.0430	.0501	.0550	.0330
Loading from storage.....	.0079	.0242	.0465	.0469	.0233	.0237	.0309	.0688	.0400	.0345	.0227	.0130	.0313
Repairs to equipment.....	.0774	.2139	.2413	.0990	.0457	.0801	.2445	.2034	.1450	.0660	.0440	.0460	.1186
Dredging and towing.....	.4934	.4041	.6329	.5440	.2795	.4666	.4869	.5224	.3337	.5125	.3212	.3199	.4298
Plant arbitrary.....	.1000	.1000	.1000	.1000	.1000	.1000	.1000	.1000	.1000	.1000	.1000	.1000	.1000
Division expense.....	.0235	.0402	.0523	.0345	.0285	.0292	.0338	.1232	.0468	.0265	.0198	.0239	.0377
Total division cost.....	.8035	.8618	1. 2257	.9332	.5702	.7831	1. 0313	1. 1463	.7688	.8459	.6283	.6269	.8235
In addition to the above, there was dredged and towed to point of work as follows:													
Quantity.....cubic yards.....							5, 534	3, 011	2, 487	3, 132	4, 506	3, 622	22, 292
Unit cost.....							\$0. 5033	\$0. 5554	\$0. 3183	\$0. 4990	\$0. 3483	\$0. 3171	\$0. 4275

TABLE No. 31.—Panama Canal—Detail of cost of production and distribution of electric current for fiscal year 1917.

	July.	August.	September.	October.	November.	December.
Power plants:						
Gatun hydroelectric.....	\$2,305.71	\$2,798.85	\$2,065.28	\$1,984.61	\$1,735.88	\$2,403.57
Miraflores steam.....	5,029.21	5,837.97	6,293.95	8,491.60	6,928.80	5,822.33
Reserve for depreciation.....	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00
Total production cost.....	15,334.92	16,636.82	16,359.24	18,476.21	16,664.66	16,225.90
Substations:						
Cristobal.....	828.22	994.50	957.46	1,048.53	1,041.97	882.55
Gatun.....	997.89	1,007.49	972.84	1,074.43	975.23	837.49
Miraflores.....	1,338.00	1,202.81	1,271.67	1,123.64	970.04	1,228.73
Balboa.....	812.41	846.67	1,016.61	875.41	758.23	767.25
Transmission lines:						
Cristobal to Gatun.....	179.87	194.46	310.91	208.00	178.57	200.45
Miraflores to Balboa.....	181.13	225.58	52.84	164.96	340.28	184.74
Gatun to Miraflores.....	1,210.23	1,284.75	1,078.32	1,023.05	693.93	1,035.06
Distribution line expense.....	2,898.55	1,844.16	3,154.71	6,015.70	3,421.10	3,952.95
Cost of current distributed.....	23,781.22	24,237.24	25,174.60	30,009.93	25,044.03	25,315.12
Kilowatt hours distributed.....	3,351,475	3,634,535	3,205,917	3,416,131	3,653,495	3,504,495
Cost per kilowatt hour:						
Production.....	\$0.0046	\$0.0046	\$0.0051	\$0.0054	\$0.0046	\$0.0046
Current distributed.....	.0071	.0067	.0079	.0088	.0069	.0072

TABLE No. 31.—Panama Canal—Detail of cost of production and distribution of electric current for fiscal year 1917—Continued.

	January.	February.	March.	April.	May.	June.	Total.
Power plants:							
Gatun hydroelectric.....	\$2,101.82	\$2,469.57	\$2,426.32	\$2,421.83	\$2,452.77	\$2,359.59	\$27,525.80
Miraflores steam.....	4,911.32	4,462.66	4,954.90	5,911.95	7,002.55	6,757.32	72,405.07
Reserve for depreciation.....	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	96,000.00
Total production cost.....	15,013.64	14,932.23	15,381.22	16,333.78	17,455.32	17,116.91	195,930.87
Substations:							
Cristobal.....	775.74	1,952.04	1,192.43	1,166.04	1,102.52	779.32	12,721.32
Gatun.....	1,013.23	1,202.85	1,095.82	1,304.28	1,554.48	1,000.44	13,086.62
Miraflores.....	1,501.78	1,136.50	1,721.04	1,661.18	1,153.72	1,324.35	13,833.46
Balboa.....	833.19	868.75	995.24	1,130.55	1,140.24	933.45	10,978.00
Transmission lines:							
Cristobal to Gatun.....	367.86	123.20	140.65	327.59	391.33	248.39	2,871.28
Miraflores to Balboa.....	142.40	82.72	60.06	170.43	246.16	1,280.37	3,131.67
Gatun to Miraflores.....	1,697.14	2,076.95	1,536.58	1,128.80	1,105.29	92.06	13,962.16
Distribution line expense.....	3,331.34	6,937.36	4,747.98	5,213.78	5,560.42	3,788.54	50,866.59
Cost of current distributed.....	24,676.37	29,312.60	26,871.02	28,436.43	29,709.48	26,823.83	319,391.87
Kilowatt hours distributed.....	3,608,644	3,623,925	3,874,446	3,784,860	4,080,612	4,005,367	43,743,902
Cost per kilowatt hour:							
Production.....	\$0.0042	\$0.0041	\$0.0040	\$0.0043	\$0.0043	\$0.0043	\$0.0045
Current distributed.....	.0068	.0081	.0069	.0075	.0073	.0067	.0073

TABLE No. 32.—*Panama Canal—Cost of water per 1,000 gallons, fiscal year 1917, Ancon-Balboa-Panama system.*

[Quantities exclude water used in city of Panama and north of Pedro Miguel.]

	Quantity, 1,000 gallons.	Operation Gamboa pump station.	Operation Miraflores filtration plant.	Operation Balboa pump station.	Mainte- nance water mains.	Total.
1916.						
July.....	150,356	\$0.0119	\$0.0173	\$0.0093	\$0.0177	\$0.0562
August.....	134,619	.0112	.0184	.0101	.0148	.0545
September.....	132,388	.0110	.0223	.0090	.0164	.0587
October.....	132,323	.0133	.0191	.0115	.0420	.0859
November.....	125,841	.0143	.0167	.0112	.0215	.0637
December.....	129,638	.0111	.0169	.0094	.0201	.0575
1917.						
January.....	157,122	.0119	.0218	.0089	.0131	.0557
February.....	120,198	.0118	.0172	.0118	.0247	.0655
March.....	164,472	.0128	.0165	.0099	.0127	.0519
April.....	127,623	.0125	.0178	.0104	.0163	.0570
May.....	120,957	.0116	.0205	.0109	.0295	.0725
June.....	115,093	.0124	.0225	.0112	.0292	.0753
Total.....	1,610,630	.0121	.0189	.0102	.0210	.0622

TABLE No. 33.—*Panama Canal—Cost of water per 1,000 gallons, fiscal year 1917, Colon-Cristobal system.*

[Quantities exclude water used in city of Colon.]

	Quantity, 1,000 gallons.	Mainte- nance Brazos Brook Reservoir.	Operation Mount Hope filtration plant.	Operation Mount Hope pump station.	Mainte- nance water mains.	Total.
1916.						
July.....	61,574	\$0.0106	\$0.0138	\$0.0167	\$0.0460	\$0.0871
August.....	66,989	.0206	.0112	.0140	.0312	.0770
September.....	73,022	.0213	.0129	.0170	.0611	.1123
October.....	66,487	.0214	.0134	.0178	.0528	.1054
November.....	67,588	.0310	.0121	.0208	.0353	.0992
December.....	66,919	.0349	.0121	.0155	.0310	.0935
1917.						
January.....	73,175	.0091	.0109	.0137	.0031	.0306
February.....	68,355	.0083	.0112	.0144	.0298	.0637
March.....	75,610	.0072	.0165	.0167	.0343	.0747
April.....	69,217	.0090	.0181	.0151	.0404	.0826
May.....	76,769	.0120	.0176	.0165	.0333	.0794
June.....	78,648	.0208	.0126	.0161	.0345	.0840
Total.....	84,353	.0171	.0136	.0162	.0363	.0822

¹ Indicates credit.

TABLE NO. 34.—*Panama Canal—Cost of water per 1,000 gallons, fiscal year 1917, Gatun system.*

	Quantity, 1,000 gallons.	Mainte- nance Agua Clara Reservoir.	Operation Agua Clara filtration plant.	Operation Agua Clara pump station.	Mainte- nance water mains.	Total.
1916.						
July.....	19,637	\$0.1194	\$0.0485	\$0.0539	\$0.0417	\$0.2635
August.....	21,700	.1053	.0353	.0682	.0240	.2333
September.....	20,499	.0984	.0528	.0521	.0323	.2356
October.....	18,884	.0837	.0473	.0547	.0109	.1966
November.....	21,590	.0583	.0401	.0471	.0561	.2016
December.....	25,825	.0392	.0287	.0337	.0268	.1284
1917.						
January.....	31,878	.0137	.0188	.0351	.0285	.0961
February.....	31,159	.0213	.0247	.0358	.0326	.1144
March.....	37,407	.0187	.0196	.0303	.0362	.1048
April.....	32,663	.0204	.0269	.0353	.0182	.1008
May.....	31,371	.0232	.0239	.0357	.0253	.1081
June.....	32,404	.0239	.0261	.0365	.0323	.1188
Total.....	325,017	.0445	.0304	.0411	.0302	.1462

TABLE No. 35.—*Cost of operating all quarters for employees, fiscal year 1917.*

	July.	August.	Septem-ber.	October.	Novem-ber.	Decem-ber.	January.	February.	March.	April.	May.	June.	Total.
Repairs to buildings.....	\$9,464.31	\$20,609.72	\$25,639.99	\$20,174.71	\$16,537.39	\$16,003.04	\$16,810.76	\$13,104.02	\$8,798.40	\$8,912.78	\$6,829.20	\$6,905.84	\$169,805.16
Repairs to furniture.....	3,625.90	4,612.62	4,678.46	3,900.10	4,213.92	4,698.29	4,306.08	2,915.62	2,561.26	2,775.97	2,883.78	2,947.38	44,419.47
Repairs to stoves.....	1,070.26	689.41	1,284.47	1,702.58	1,558.35	1,360.31	1,319.03	1,315.52	1,725.87	1,075.60	2,059.62	1,210.45	16,401.50
Mattress factory.....	560.38	1,672.91	980.46	976.07	379.31	476.72	1,184.87	1,053.57	5,598.98	13,317.74	6,137.58	112,098.05	20,199.24
Coal and kindling.....	2,856.64	5,514.74	4,562.71	4,281.89	4,911.42	6,660.78	7,683.43	9,584.51	6,836.01	7,243.04	8,892.60	7,839.40	76,867.17
Electric lighting.....	3,120.92	3,411.62	4,072.68	4,416.47	3,970.88	3,393.18	4,039.46	3,839.13	4,411.79	4,637.23	5,069.64	5,155.51	50,138.51
Corral service.....	2,119.19	2,302.74	2,427.27	2,266.36	3,245.19	2,254.43	2,374.52	2,188.47	2,253.11	2,322.50	2,900.77	3,233.65	29,988.20
Janitor service.....	4,383.10	4,593.75	4,503.58	4,510.09	4,710.06	4,580.48	4,996.63	4,763.63	4,823.63	4,780.58	5,333.63	4,233.97	56,884.13
Utility service.....	582.02	811.47	1,134.26	1,019.18	1,002.73	1,540.33	955.61	2,496.35	1,641.00	1,579.83	1,393.52	1,500.14	15,686.44
Disposal of garbage.....	1,278.01	918.36	874.87	1,006.33	882.90	1,092.60	1,176.85	1,304.40	1,242.21	1,403.36	1,279.94	1,509.90	13,798.63
Care of grounds.....	3,133.82	3,448.85	1,623.68	1,029.22	1,727.85	1,041.82	2,845.60	2,915.53	2,231.19	1,494.75	1,618.20	2,233.85	25,044.36
Grass cutting.....	3,377.85	1,271.37	2,208.40	2,079.47	2,500.49	1,915.95	1,597.48	562.55	475.06	235.05	705.55	1,235.74	16,224.46
Division expense.....	2,137.18	2,323.96	2,600.51	2,448.28	2,209.66	2,307.05	2,272.52	2,412.82	2,285.88	2,337.75	2,665.56	2,924.82	28,926.29
Total division cost.....	35,713.07	51,917.55	56,550.64	49,810.75	47,970.15	47,834.68	51,682.84	48,486.12	45,179.39	52,116.18	47,829.59	29,292.60	564,383.56

¹ Indicates credit account mattresses manufactured for new quarters from material drawn during March, April, and May.

TABLE No. 36.—Statement of appropriation receipts and disbursements for fiscal year ended June 30, 1917.

	Receipts.			Total available.	Expenditures.			Cash balance June 30, 1917.
	Cash balance July 1, 1916.	Appropriations.	Collections.		Transfers between departments.	Disbursements.	Total.	
Canal connecting Atlantic and Pacific Oceans.....	\$707,349.08	.....	.....	\$707,349.08	.....	\$189,741.68	\$189,755.45	\$517,597.63
Panama Canal fund.....	1,217,933.48	.....	85,992.79	1,223,946.27	.....	.....	.....	801,580.14
Construction and equipment.....	3,063,037.62	.....	1,133,795.11	13,946,832.73	.....	47,692.03	492,366.13	3,993,434.67
Maintenance and operation.....	1,288,472.14	.....	6,346,096.24	21,956,893.07	.....	3,707,745.34	9,953,308.06	888,447.49
Sanitation.....	101,253.22	.....	328,896.71	1,830,149.93	.....	21,068,450.38	21,068,450.38	774,330.92
Civil government.....	65,676.19	.....	29,442.62	695,118.81	.....	170,309.76	1,055,794.01	67,911.59
Total.....	6,443,741.33	17,500,000.00	7,844,223.47	40,360,294.89	8,572,329.69	570,717.27	627,207.22	7,043,318.44
Presenting launch Louise to French Government.....	.....	159.01	.....	159.01	.....	26,569,886.15	6,747,090.30	.....
Private act Feb. 18, 1913, Oscar F. Lackey.....	1,500.00	.....	.....	1,500.00	.....	.....	.....	159.01
Annual payment to Republic of Panama.....	.....	500,000.00	.....	500,000.00	.....	250,000.00	.....	1,500.00
Private act Aug. 4, 1916, Joseph A. Buckholdt.....	.....	3,000.00	.....	3,000.00	.....	3,000.00	250,000.00	250,000.00
Private act Aug. 8, 1916, Olaf Nelson.....	.....	1,200.00	.....	1,200.00	.....	1,200.00	1,200.00	.....
Judgments, Court of Claims, War.....	.....	2,537.20	.....	2,537.20	.....	2,537.20	2,537.20	.....
Total.....	1,659.01	506,737.20	.....	508,396.21	.....	256,737.20	256,737.20	251,659.01
Panama fortifications.....	513,571.79	.....	.....	558,201.80	.....	446,939.23	.....	111,262.57
Armament of fortifications.....	156,760.59	5,643,000.00	172.35	5,799,760.59	.....	803,960.96	.....	4,995,799.63
Army quarters, storehouses, etc.....	49,442.09	2,000,000.00	.....	2,049,442.09	.....	4,489.67	.....	240,864.19
Electric light and power plants.....	2,037.70	55,000.00	.....	57,037.70	.....	1,804,088.23	139.40	56,918.30
Fire control at fortifications.....	106,928.15	.....	.....	106,928.15	.....	20,867.36	46,935.14	59,993.01
Maintenance of clearings and trails.....	2,762.79	30,000.00	.....	32,762.79	.....	26,067.78	24,649.76	8,113.03
Maintenance of fire-control installations.....	.....	10,000.00	.....	10,000.00	.....	23,922.20	6,875.00	3,125.00
Maintenance of searchlights and electric power equipment.....	1,591.65	7,500.00	.....	9,091.65	.....	8,333.31	758.34	9,091.65
Land defenses.....	.....	29,500.00	.....	29,500.00	.....	.....	.....	29,500.00
Ordnance depot.....	.....	533,200.00	.....	533,200.00	.....	106,623.77	.....	426,576.23
Preservation and repair of fortifications.....	9,066.07	15,000.00	.....	24,066.07	.....	12,151.28	11,914.70	24,066.07
Reserve equipment for fortifications.....	42,000.00	.....	.....	42,000.00	.....	17,000.00	.....	25,000.00
Seacoast batteries.....	.....	405,000.00	.....	405,000.00	.....	182,210.97	17,000.00	222,789.03
Searchlights for seacoast fortifications.....	66,003.65	78,774.00	206.20	144,983.85	.....	2,548.17	2,548.17	142,435.68
Submarine mines.....	.....	540,000.00	.....	540,000.00	.....	1,822.57	1,822.57	538,177.43
Submarine mine structures.....	.....	47,000.00	.....	47,000.00	.....	.....	.....	47,000.00
Total.....	950,184.48	9,393,974.00	378.55	10,388,994.69	44,457.66	1,637,883.89	1,843,556.70	6,907,554.10
Grand total.....	7,395,585.22	27,400,711.20	7,844,602.02	51,257,685.79	8,616,787.35	28,464,507.24	37,055,154.24	14,202,531.55

TABLE No. 37.—*Payments made by fiscal officers, fiscal year 1917.*

PAYMASTER.

Month.	Panama Canal payments.				Panama Railroad payments.			Grand total.
	Gold rolls.	Silver rolls.	Vouchers.	Total.	Pay rolls.	Vouchers.	Total.	
1916.								
July.....	\$494,692.09	\$453,642.58	\$478,355.62	\$1,426,690.29	\$256,896.59	\$491,172.19	\$748,068.78	\$2,174,739.07
August.....	493,900.53	455,221.64	596,786.68	1,545,998.85	283,077.48	397,135.59	680,213.07	2,226,211.92
September.....	505,433.03	494,130.61	686,701.40	1,686,265.04	282,785.91	411,060.43	693,846.34	2,380,111.38
October.....	502,400.36	476,716.30	499,711.92	1,478,828.58	271,793.40	922,230.75	1,194,024.15	2,672,852.73
November.....	526,081.44	476,549.30	462,890.06	1,465,520.80	266,682.64	442,659.61	709,342.25	2,174,863.05
December.....	533,656.37	493,491.50	507,365.65	1,534,514.02	277,102.96	466,811.40	743,914.36	2,278,428.38
1917.								
January.....	505,829.11	500,379.04	715,198.82	1,721,406.97	261,983.18	434,804.69	696,587.87	2,417,994.84
February.....	324,099.29	327,175.04	500,353.87	1,551,628.20	279,379.58	490,096.28	769,475.86	2,321,104.06
March.....	328,073.49	496,076.94	612,409.06	1,636,559.49	264,538.53	526,039.38	790,577.91	2,427,137.40
April.....	339,233.73	542,943.32	588,858.02	1,671,035.07	289,231.58	464,459.77	753,691.35	2,424,736.42
May.....	514,886.67	494,277.85	506,112.11	1,515,276.63	285,717.24	522,047.17	807,764.41	2,323,041.04
June.....	538,574.11	503,655.60	510,917.56	1,553,147.27	281,497.20	491,735.79	776,232.99	2,329,386.26
Total.....	6,206,950.72	5,914,259.72	6,665,660.77	18,786,871.21	3,300,686.29	6,063,053.05	9,363,739.34	28,150,610.55

TABLE No. 37.—*Payments made by fiscal officers, fiscal year 1917—Continued.*
COLLECTOR.

Month.	Disbursing clerk.	Total.	Canal Zone funds.	Culhouses funds.	Trust funds.	Postal savings funds.	Money-order funds.	Interest.
1916.								
July.....	\$637,616.75	\$176,460.88	.....	\$10,000.10	\$494.78	\$436.00	\$165,440.00	.....
August.....	807,045.13	179,481.01	.....	12,520.96	181.05	.....	166,770.00	.....
September.....	655,610.15	24,264.77	.....	10,600.26	186.51	1,012.00	12,466.00	.....
October.....	1,093,405.95	294,620.95	.....	13,663.35	.....	.....	279,015.00	.....
November.....	820,790.63	177,101.94	.....	9,816.20	233.74	902.00	166,150.00	.....
December.....	984,542.72	198,772.57	\$2,816.02	15,917.36	237.18	.....	179,600.00	\$152.01
1917.								
January.....	1,044,216.66	156,938.68	.....	15,192.06	.....	160.00	141,500.00	86.62
February.....	1,150,233.81	59,136.43	.....	12,841.97	1,197.49	.....	45,001.25	95.72
March.....	1,066,605.52	169,079.39	.....	13,790.46	4,981.81	.....	150,001.00	207.12
April.....	1,095,611.72	170,738.18	.....	19,916.48	1,804.36	.....	148,800.00	217.34
May.....	737,307.40	191,495.63	25.70	8,858.99	71.45	850.00	181,312.40	377.09
June.....	760,296.24	247,114.24	.....	27,779.28	1,452.67	8,872.00	208,110.00	900.29
Total.....	10,853,282.65	2,045,204.67	2,841.72	172,939.07	10,891.04	12,232.00	1,844,264.65	2,036.19

TABLE No. 38.—*Statement of collections repaid to appropriations and to individuals and companies and collections deposited to miscellaneous receipts during the fiscal year ended June 30, 1917.*

Department and classification.	Total, fiscal year 1917.	Department and classification.	Total, fiscal year 1917.
DEPARTMENT OF OPERATION AND MAINTENANCE.		ACCOUNTING DEPARTMENT—contd.	
Construction and repairs	\$925,517.74	Lost property	\$919.56
Shopwork	1,653,300.48	Overpayments, refunds, etc.	21,325.84
Electric work	221,128.09		
Electric current	72,270.86	Total, accounting department ..	187,278.66
Compressed air	170.50		
Train service and use of rolling equipment	25,805.67	EXECUTIVE DEPARTMENT.	
Tug service	93,968.92	Proportion of salaries	59,478.25
Service of other floating equipment ..	46,593.95	Photographs and prints	548.92
Pilotage	43,192.00	Motor-car service	2,838.32
Wharfage	23,210.12	Minor services, supplies and property	163.97
Sales of water	122,689.68	Canal Record	451.43
Water rentals, Panama and Colon ..	156,782.00		
Meals furnished	61,392.51	Total, executive department	63,480.89
Handling lines	19,664.50		
Steamship inspections	3,119.17	CIVIL GOVERNMENT.	
Dredging	70,916.93	School tuition	3,502.69
Hostling	9,844.87	Sale of schoolbooks	524.88
Minor supplies, services and property ..	34,986.70	Police service	23,526.38
Dry dockage, Balboa	53,341.32	Minor services, supplies and property ..	1,783.43
Dry dockage, Cristobal	9,778.92	Sales of lumber, Industrial Training School ..	96.74
Rent for duct line, Panama Government ..	225.00	Sale of ammunition to policemen for target practice	8.50
Part of cost of Cristobal coaling plant chargeable to Panama Railroad ..	475,000.00		
		Total, civil government	29,442.62
Total, department of operation and maintenance	4,122,899.93		
SUPPLY DEPARTMENT.		MISCELLANEOUS.	
Subsistence:		Land rental	15,005.63
Hotel Tivoli	141,722.07	Building rental	4,085.72
Hotel Aspinwall	9,952.67	Land office expense	11,000.00
Line hotels	7,732.43	Joint Land Commission transcripts ..	102.50
Messes	1,259.39	Equipment rental	312.47
Minor services, supplies and property ..	453.90	Piling lost ex S. S. Freda and recovered and used by Panama Railroad in construction of Pier No. 7 ..	523.12
Hotel coupon books	54.60		
Laborers' meal tickets	124,739.03	Total, miscellaneous	31,629.44
Commissary books honored by Panama Canal	490,172.23		
Total, subsistence	776,086.32	HEALTH DEPARTMENT.	
Quartermaster:		Ancon Hospital:	
Material from stock	1,659,084.72	Fees	117,800.29
Rock, sand, gravel, and screenings ..	20,628.64	Mess	20,440.15
Printing and binding	19,290.51	Burials	3,311.49
Corral	48,478.46	Miscellaneous	937.66
Miscellaneous jobs	77,913.94	Colon Hospital:	
Rental of gold quarters	23,544.67	Fees	11,732.27
Rental of silver quarters	83,554.38	Mess	2,032.01
Garage rental	4,870.52	Miscellaneous	77.64
Ancon nursery	909.15	Palo Seco Leper Asylum	13,550.16
Hand lines of fuel oil	50,109.04	Lime dispensaries	1,217.75
Operation of stores	45,000.00	Quarantine:	
Operation of quarters	55,000.00	Subsistence	15,680.80
Minor services, supplies and property ..	967.45	Other charges	11,432.27
Fuel oil	140,888.64	Sanitation:	
Cost of making sales	69,838.39	Panama	9,601.19
Containers in transit	4,808.94	Colon	10,615.61
		Zone	8,380.67
Total, quartermaster	2,304,887.45	Street cleaning:	
Total, supply department	3,080,973.77	Panama	29,083.32
		Colon	11,826.16
ACCOUNTING DEPARTMENT.		Corozal Hospital:	
Lost metal checks	1,552.79	Produce	14,253.05
Cablegrams	2,821.06	Pasturage	74.00
Proportion of salaries	123,176.13	Burials	188.51
Proportion of printing commissary books ..	37,483.28	Insane asylum	36,103.47
		Sales from medical store	10,134.85
		Santo Tomas Hospital mess	261.74
		Minor services, supplies and property ..	153.01
		Expenses incurred in deportation of insane patients	8.60
		Total, health department	328,896.71

TABLE No. 38.—Statement of collections repaid to appropriations, etc.—Cont'd.

RECAPITULATION.

Department and classification.	Total, fiscal year 1917.	Department and classification.	Total, fiscal year 1917.
Department of operation and maintenance.....	\$4,122,899.93	Miscellaneous receipts, United States funds:	
Supply department:		Tolls.....	\$5,633,362.06
Subsistence.....	776,086.32	Sale of construction material and equipment.....	118,345.32
Quartermaster.....	2,304,887.45	Water rentals, Panama and Colon.....	102,584.43
Accounting department.....	187,278.66	Licenses and taxes.....	15,302.98
Executive department.....	63,480.89	Court fees and fines.....	17,772.93
Total operation and maintenance.....	7,454,633.25	Postal receipts.....	97,677.74
Total civil government.....	29,442.62	Miscellaneous—Canal Zone.....	725.25
Total sanitation.....	328,896.71	Interest—Bank balances.....	5,759.96
Total miscellaneous.....	31,629.44	Federal income tax.....	322.32
Total, repayment to appropriations.....	7,841,602.02	Sale of french scrap.....	15,403.24
Collections for individuals and companies:		Overage, collecting agents.....	3.42
Panama Railroad, general.....	3,125.23	Total, miscellaneous receipts..	6,007,259.65
Panama Railroad, commissary books.....	2,936,582.63	Grand total for year.....	16,891,142.16
Miscellaneous, individuals and companies.....	95,784.56		
Transfer to special deposit account.....	2,946.00		
Total, collections for individuals and companies.....	3,038,438.42		

TABLE No. 39.—Statement of transactions in the collector's special deposit account during the fiscal year ended June 30, 1917.

IN THE UNITED STATES.

Month.	Deposits.	Panama Canal bills applied.	Payments to individuals and companies. ¹	Refunds.
1916.				
July.....	\$271,105.40	\$186,594.51	\$64,917.59	\$24,893.83
August.....	353,136.48	187,234.00	84,777.82	73,170.39
September.....	316,266.98	208,480.33	48,620.45	47,196.82
October.....	234,307.90	178,066.69	56,865.25	26,270.09
November.....	267,782.23	139,209.21	64,349.12	29,383.83
December.....	360,500.32	175,852.81	110,887.04	29,534.40
1917.				
January.....	354,252.77	264,380.19	95,556.92	59,764.55
February.....	283,802.45	173,733.44	81,991.74	50,515.86
March.....	291,047.27	137,466.90	86,899.51	24,130.03
April.....	323,355.09	159,396.35	75,915.74	36,948.45
May.....	241,236.00	151,556.79	49,859.27	51,470.25
June.....	326,542.04	185,994.22	79,878.50	34,759.22
Total.....	3,623,334.93	2,147,965.44	897,519.61	488,037.72

ON THE ISTHMUS.

1916.				
July.....	\$436,511.15	\$311,583.14	\$157,371.94	\$5,878.87
August.....	416,588.19	252,696.91	151,202.58	1,250.01
September.....	492,244.45	338,049.68	159,274.61	4,918.85
October.....	484,594.49	310,503.15	183,649.99	2,322.15
November.....	485,377.81	307,591.60	162,415.64	187.39
December.....	493,678.05	372,545.32	145,620.10	2,658.90
1917.				
January.....	632,213.93	371,038.32	211,428.43	2,824.72
February.....	682,776.45	313,081.44	182,980.62	193.32
March.....	553,187.31	479,424.83	148,155.26	75,646.05
April.....	636,364.46	430,434.87	169,116.87	3,557.89
May.....	620,029.17	402,180.03	184,120.89	2,885.54
June.....	707,575.46	499,945.34	258,315.76	3,316.43
Total.....	6,641,140.92	4,389,074.63	2,113,652.69	105,640.71

¹ Includes the Panama Railroad Company, Central & South American Telegraph Co., and other individuals and companies.

TABLE No. 39.—*Statement of transactions in the collector's special deposit account during the fiscal year ended June 30, 1917—Continued.*

RECAPITULATION.

	In the United States.		On the Isthmus.	
	Debit.	Credit.	Debit.	Credit.
On hand July 1, 1916.....	\$106,065.59	.....	\$159,065.61	.....
Deposits during year.....	3,623,334.93	.....	6,641,140.92	.....
Panama Canal bills applied.....	.....	\$2,147,965.44	.....	\$4,389,074.63
Payments to individuals and companies.....	.....	897,519.01	.....	2,113,652.69
Refunds.....	.....	488,037.72	.....	105,640.17
On hand June 30, 1917.....	.....	195,878.35	.....	191,839.04
Total.....	3,729,400.52	3,729,400.52	6,800,206.53	6,800,206.53

TABLE No. 40.—*Statement of audited pay rolls on Isthmus during fiscal year 1917.*

Operation and maintenance.....		\$8,732,378.76
Executive office.....		\$311,541.51
Executive.....	\$19,084.41	
Record.....	51,135.66	
Personnel.....	20,081.69	
Correspondence.....	45,432.25	
Property.....	25,405.84	
Statistics.....	9,730.16	
General.....	26,478.31	
Timekeeping.....	85,276.05	
Motor cars.....	10,364.66	
Clubs and playgrounds.....	18,552.50	
Engineer of maintenance.....		702,379.41
Office engineer.....	72,535.08	
Meteorology and hydrography.....	22,559.64	
Surveys.....	29,880.34	
Lock operation and maintenance.....	542,891.59	
Maintenance, Gatun dam and backfill.....	34,512.76	
Marine division.....		369,537.14
Office.....	4,850.80	
Port captain, Balboa.....	144,310.91	
Port captain, Cristobal.....	175,523.83	
Maintenance, aids to navigation.....	26,409.18	
Emergency protection.....	18,442.42	
Electrical.....		496,160.17
Municipal engineering.....		1,127,872.74
Dredging.....		1,668,092.18
Mechanical.....		2,622,289.11
Balboa shops.....	1,791,596.12	
Paraiso shops.....	244,277.15	
Cristobal shops.....	586,415.84	
Railroad transportation.....		3,069.46
Supply department.....		1,001,586.94
Quartermaster.....	882,362.54	
Office.....	\$27,676.48	
Storehouses.....	259,098.37	
District quartermasters.....	526,679.82	
Printing plant.....	48,564.15	
Fuel-oil plants.....	20,343.72	
Subsistence.....	119,224.40	
Accounting.....		385,837.12
Auditor.....	314,491.87	
Paymaster.....	39,831.95	
Collector.....	31,513.30	
Injury and death (old acts).....		14,395.76
Injury and death (new act).....		29,617.22
Construction and equipment.....		2,103,762.98
Terminals.....		207,596.12
Buildings.....		1,719,178.71
Joint Commission.....		139,509.87
Land office and special attorney.....		18,446.91
Dock No. 6, Cristobal.....		112,082.78
Injury and death.....		6,948.59

¹ Includes \$30,761.10 paid by voucher.

Civil government			\$483,583.86
Civil affairs		\$27,317.75	
Posts		84,785.99	
Police		204,983.96	
Fire		58,987.41	
District attorney		7,292.92	
District court		15,894.16	
Magistrate courts		10,977.66	
Marshal		7,727.67	
Schools		65,541.34	
Injury and death		75.00	
Sanitation			572,534.61
Chief health office		3,579.71	
Medical storehouse		9,037.08	
Ancon Hospital		212,937.73	
Colon Hospital		27,291.43	
Santo Tomas Hospital		11,761.50	
Palo Seco Leper Asylum		9,895.53	
Dispensaries		27,143.09	
Quarantine		39,046.98	
Office	945.00		
Balboa	15,605.02		
Cristobal	21,296.96		
Bocas del Toro	1,200.00		
Corozal Hospital		42,489.41	
Farm	15,961.34		
Asylum	26,528.07		
Health office, Panama		72,456.98	
Health office, Colon		54,292.51	
Zone sanitation		62,332.18	
Injury and death		270.48	
Fortifications			338,334.25
Construction		314,383.41	
Fire control		2,700.00	
Ordinance machinists and clerk		19,000.47	
Army quarters, etc		1,726.41	
Maintenance, clearings and trails		519.34	
Injury and death		4.62	
Omitted time prior to Apr. 1, 1914			212.69
Total			12,230,807.15

TABLE NO. 41.—Statement of accounts receivable registered during the fiscal year ended June 30, 1917.

Month.	Number of bills registered.	Total.	Against the Panama Railroad.	Against the Canal Zone Government.	Against the Republic of Panama.	Against other departments of United States Government.	Against steamship companies.	Against other individuals and companies.	Trust funds.		For various collections, hospitals and messes.	Tolls.	Repay to appropriations.
									For pay-roll deductions.	Other collections.			
1916.													
July.....	1,293	\$1,010,175.39	\$393,440.79	.....	\$11,166.63	\$32,644.00	\$52,804.60	\$48,140.42	.....	\$11,556.00	.....	\$480,122.95	\$519,719.10
August.....	1,232	1,966,613.10	1,247,683.06	.....	10,632.06	28,000.96	33,267.11	32,325.47	\$206,984.82	10,729.50	\$7,600.12	417,080.00	394,708.68
September.....	1,240	1,239,247.98	354,755.90	.....	12,537.61	58,932.30	37,800.76	39,135.19	222,738.66	5,140.00	5,574.22	493,603.34	516,730.33
October.....	1,266	1,291,829.64	369,188.71	.....	14,537.85	94,982.93	38,571.25	73,828.92	220,886.64	6,412.40	5,471.60	465,949.34	583,988.56
November.....	1,191	1,112,670.99	299,798.37	.....	10,941.76	40,232.03	40,992.88	74,201.57	221,284.46	299.78	4,776.91	420,113.23	470,738.37
December.....	1,281	1,304,813.25	349,447.45	.....	17,370.40	63,973.71	131,211.74	57,308.23	233,223.29	.....	5,262.61	447,015.82	601,525.62
1917.													
January.....	1,366	1,543,048.78	351,956.66	.....	12,735.62	242,848.80	87,273.53	34,283.39	281,534.74	.....	6,287.31	526,128.73	730,717.74
February.....	1,165	1,375,945.82	352,888.95	.....	10,819.05	84,201.36	81,742.00	142,131.62	250,094.94	482.29	4,620.60	438,965.01	675,615.79
March.....	1,365	1,379,845.60	318,001.04	.....	13,006.26	165,621.30	80,400.70	108,993.70	238,870.92	392.81	4,846.16	449,622.71	685,636.13
April.....	1,543	1,558,828.24	302,703.98	.....	22,380.63	325,260.65	53,738.64	84,828.67	255,477.62	387.61	.....	514,050.44	503,264.29
May.....	1,624	1,576,331.42	384,911.24	.....	17,677.62	286,350.93	57,867.67	109,688.20	245,099.67	698.04	9,830.29	468,207.76	843,553.31
June.....	1,800	1,617,991.95	334,667.66	.....	16,780.21	333,580.18	97,228.18	58,213.02	252,075.53	888.63	3,636.21	520,922.33	833,826.28
Total.....	16,386	17,007,342.16	5,059,443.81	.....	166,975.70	1,756,670.15	804,899.06	865,088.40	2,628,281.29	37,287.06	56,915.03	5,631,781.66	7,360,126.20
Total for year ended June 30, 1916.....	12,754	11,786,187.91	4,182,435.79	21,190.32	180,800.94	607,794.73	328,026.36	1,055,525.44	2,775,534.90	185,362.39	49,686.62	2,399,830.42	6,186,622.08

TABLE No. 42.—Statement of commissary books issued during fiscal year ended June 30, 1917, for which collections have been made on pay rolls.

Month.	\$2.50 books.		\$5 books.		\$15 books.		Total value.
	Number.	Value.	Number.	Value.	Number.	Value.	
1916-17.							
July.....	25,186	\$62,965.00	28,214	\$141,070.00	4,751	\$71,265.00	\$275,300.00
August.....	27,527	68,817.50	29,689	148,445.00	4,921	73,815.00	291,077.50
September.....	27,268	63,170.00	29,640	148,200.00	5,076	76,140.00	287,510.00
October.....	27,325	68,312.50	27,857	139,285.00	5,300	79,500.00	287,097.50
November.....	28,375	70,937.50	28,442	142,210.00	5,872	88,080.00	301,227.50
December.....	29,637	74,092.50	37,127	185,635.00	6,687	100,305.00	360,032.50
January.....	29,637	73,695.00	30,940	154,700.00	6,101	91,515.00	321,820.00
February.....	30,242	69,340.00	29,385	146,925.00	5,899	88,485.00	304,950.00
March.....	27,816	69,340.00	32,119	160,565.00	6,320	94,800.00	330,060.00
April.....	29,806	74,665.00	32,119	155,090.00	6,171	92,565.00	319,297.50
May.....	28,637	71,642.50	31,018	155,090.00	6,191	92,865.00	327,982.50
June.....	27,347	68,367.50	33,346	166,730.00	6,191	92,865.00	327,982.50
	27,114	67,785.00	32,325	161,640.00	6,049	90,735.00	320,160.00
Total.....	334,360	\$835,900.00	370,105	1,850,525.00	69,338	1,040,070.00	3,726,495.00

TABLE No. 43.—Statement of commissary books sold for cash during fiscal year ended June 30, 1917.

Month.	\$2.50 books.		\$5 books.		\$15 books.		Total value.
	Number.	Value.	Number.	Value.	Number.	Value.	
1916-17.							
July.....	3,036	\$7,640.00	11,709	\$58,545.00	4,767	\$71,505.00	\$137,975.25
August.....	2,715	6,787.50	11,557	57,785.00	4,894	73,410.00	138,270.00
September.....	2,670	6,715.00	10,862	54,310.00	4,376	68,640.00	130,925.50
October.....	2,648	6,620.00	10,727	53,635.00	4,790	71,850.00	132,344.00
November.....	2,415	6,037.50	10,998	54,990.00	5,209	78,135.00	139,469.00
December.....	2,895	7,237.50	11,304	56,520.00	5,560	83,400.00	147,436.50
January.....	2,333	5,907.50	9,940	49,700.00	5,047	75,705.00	131,712.00
February.....	2,320	5,800.00	9,254	46,270.00	4,694	70,410.00	122,775.50
March.....	2,787	6,967.50	10,913	54,565.00	5,382	80,730.00	132,632.50
April.....	2,716	6,790.00	10,706	53,530.00	5,166	77,490.00	138,136.25
May.....	3,477	8,692.50	11,423	57,115.00	5,635	84,525.00	150,676.50
June.....	4,045	10,112.50	11,607	58,035.00	5,340	80,100.00	148,592.25
Total.....	34,107	\$85,267.50	131,000	655,000.00	61,050	915,900.00	1,660,000.25

TABLE NO. 44.—Statement of meal tickets issued to employees during fiscal year ended June 30, 1917, for which collections have been made on pay rolls.

Month.	5-cent.		9-cent.		27-cent.		40-cent.		Total value.
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	
1916-17.									
July.....	993	\$49.65	8,320	\$748.80	9,203	\$2,484.81	17,992	\$7,196.80	\$10,480.06
August.....	553	27.65	9,924	893.16	10,998	2,969.46	18,741	7,496.40	11,386.67
September.....	667	33.35	9,393	845.37	8,993	2,428.11	15,544	6,217.60	9,524.43
October.....	770	38.50	8,334	750.06	9,296	2,509.92	17,763	7,105.20	10,403.68
November.....	1,031	51.55	7,082	637.38	10,137	2,736.99	20,692	8,276.80	11,702.72
December.....	.....	.....	6,314	568.26	9,264	2,501.28	19,907	7,962.80	11,032.34
January.....	.....	.....	6,856	617.04	9,340	2,521.80	18,145	7,258.00	10,396.84
February.....	.....	.....	14,769	1,329.21	7,614	2,055.78	16,169	6,467.60	9,852.59
March.....	.....	.....	34,004	3,060.36	8,757	2,364.39	17,191	6,876.40	12,301.15
April.....	.....	.....	41,248	3,712.32	7,775	2,099.25	15,628	6,251.20	12,062.77
May.....	.....	.....	49,932	4,493.88	7,920	2,138.40	19,000	7,600.00	14,232.28
June.....	.....	.....	42,953	3,865.77	7,537	2,034.99	20,934	8,373.60	14,274.36
Total.....	4,014	200.70	239,129	21,521.61	106,834	28,845.18	217,706	87,082.40	137,649.89

TABLE NO. 45.—*Coupons honored at commissaries, hotels, nursery, messes, dredges, and clubhouses during fiscal year ended June 30, 1917.*

	Clubhouses.	Nursery.	Meals.	Commissary.	Total.
1916-17.					
July.....	\$919.28	\$120.90	\$40,561.61	\$382,609.96	\$424,211.75
August.....	902.20	159.16	40,195.67	385,575.38	426,832.41
September.....	1,634.06	131.42	38,923.11	387,841.49	428,530.08
October.....	1,647.02	117.54	40,887.87	365,847.55	408,499.98
November.....	1,836.82	138.56	41,446.74	387,978.56	431,400.68
December.....	2,170.41	167.72	43,091.40	474,955.19	520,384.72
January.....	2,182.25	213.26	42,855.00	398,523.31	443,773.82
February.....	2,095.34	166.65	39,569.33	376,989.64	418,820.96
March.....	2,297.20	158.07	42,618.82	437,864.78	482,938.87
April.....	2,209.51	210.56	39,207.31	411,254.71	452,882.09
May.....	2,475.93	210.33	39,681.47	437,423.46	479,791.19
June.....	2,787.79	208.06	37,742.21	426,803.33	467,541.39
Total.....	23,157.81	2,002.23	486,780.54	4,873,667.36	5,385,607.94

TABLE NO. 46.—*Statement of receipts and disbursements, Canal Zone funds, May 1, 1904, to June 30, 1917.*

Receipts:	
Revenues collected.....	\$1,842,799.81
Municipal funds transferred.....	83,660.36
Postal receipts.....	948,700.78
	<u>\$2,875,160.95</u>
Disbursements.....	<u>2,868,940.84</u>
Available for expenditure.....	<u>6,220.11</u>
Collector's balance June 30, 1917:	
Miscellaneous and contingent.....	1,045.48
Public improvements and schools.....	2,428.73
Postal receipts, 1915.....	2,745.90
	<u>6,220.11</u>
Separate statement covering postal service:	
Receipts.....	948,700.78
Disbursements.....	<u>945,954.88</u>
Collector's balance.....	<u>2,745.90</u>

TABLE NO. 47.—*Statement of balances of Canal Zone funds with collector, by appropriations, June 30, 1917.*

Miscellaneous and contingent.....	\$1,045.48
Public improvements and schools.....	2,428.73
Postal receipts, 1915.....	2,745.90
Postal savings funds.....	1,769.00
Money-order funds.....	1,053,478.47
Trust funds.....	8,484.07
Clubhouse funds.....	9,231.01
Interest.....	11,070.04
	<u>1,090,252.70</u>

TABLE No. 48.—*Postal Service—Statement of money orders issued and paid by the Canal Zone and Canal Zone orders paid by other administrations, fiscal years 1907 to 1917, inclusive.*

Year.	Domestic money orders issued.			Money orders paid by Canal Zone post office.				Canal Zone money orders paid by—				
	Number.	Value.		Martini- que.	Costa Rica.	United States.	Canal Zone.	Martini- que.	Costa Rica.	United States.	Canal Zone.	Cash remitted to United States Post Office Department.
1907	84,441	\$2,369,031.49				\$18,257.90	\$208,165.48			\$1,581,251.91	\$208,165.48	\$1,884,000.00
1908	153,457	4,686,684.98				33,378.45	1,017,750.97			2,875,719.61	1,017,750.97	3,055,000.00
1909	180,389	5,166,749.46				52,686.22	1,492,132.76			3,583,419.57	1,492,132.76	3,392,000.00
1910	207,220	5,228,553.60				60,470.77	1,331,568.20			4,098,650.16	1,331,568.20	3,535,000.00
1911	214,780	5,304,906.60					1,337,915.09			3,725,996.12	1,337,915.09	4,422,249.17
1912	227,680	4,915,077.26					1,280,397.88			3,521,511.95	1,280,397.88	3,580,000.00
1913	238,316	4,883,624.13				\$85.70	881,728.73			3,521,511.95	881,728.73	3,468,000.00
1914	198,828	4,029,364.97				191.95	776,265.68			4,296,948.31	776,265.68	3,401,000.00
1915	150,906	2,873,182.84				375.38	431,004.25			2,699,533.06	1,153,684.25	3,053,407.08
1916	147,042	2,417,033.83				637.45	289,011.70			2,102,740.27	1,392,441.70	2,135,043.89
1917	146,421	2,300,918.71				1,805.49	231,467.61			1,960,097.67	1,367,582.61	1,676,500.00
Total	1,949,480	44,175,127.87				828,431.76	9,277,408.35			34,476,563.18	12,239,645.35	33,592,200.14
Deposit orders issued in lieu of postal savings:												
1915	19,652	1,075,570.00					722,680.00					
1916	24,054	1,101,100.00					1,103,430.00					
1917	27,054	1,481,846.00					1,186,115.00					
Total	70,760	3,658,605.00					2,962,225.00					
Grand total	2,020,240	47,833,732.87				828,431.76	12,239,633.35			34,476,563.18	12,239,645.35	33,592,200.14

i Deposit money orders paid by Canal Zone included.

SUMMARY.

Total Canal Zone money orders issued	\$47,833,732.87
Total Canal Zone money orders paid	46,783,255.77
Total Canal Zone money orders outstanding unpaid	1,051,477.10
Amount due the United States by the Canal Zone money-order service	20,280.99
Amount of overages	11.30

Money-order funds:	
Cash on deposit with collector, Panama Canal	\$1,053,478.47
Cash due from Martinique administration	158.07
Cash due from Costa Rica administration	169.00
Cash due from postmasters	\$18,057.25
Less amount of money-order fees included	93.40
	17,963.85

\$1,071,769

\$1,071,769.39

NOTE.—Martinique and Costa Rica list of Canal Zone orders paid during quarter ended June 30, 1916, included. Martinique and Costa Rica list of Canal Zone orders paid during quarter ended June 30, 1917, not included. United States lists of Canal Zone orders paid during May and June, 1917, included, subject to adjustment on complete audit.

TABLE No. 49.—*Postal Service—Statement showing the monthly money-order business of the Canal Zone postal service during the fiscal year ended June 30, 1917.*

Month.	Money orders issued, including deposit money orders.		Interest paid on deposit orders.	Money orders paid by the Canal Zone post offices.					Canal Zone orders paid by—		
	Number.	Amount.		United States.	Martini- que.	Costa Rica.	Canal Zone. ¹	Martinique.	Costa Rica.	United States.	
1916.											
July.....	13,760	\$260,723.82	.....	\$10,126.14	\$40.14	\$141.00	\$112,239.40	.....	.....	\$89,719.62
August.....	13,531	279,511.13	.....	9,498.63	994.23	130.02	107,226.03	.....	.....	236,960.53
September.....	12,550	264,619.98	.....	10,618.62	267.94	85.00	96,357.09	.....	\$1,322.65	130,242.82
October.....	13,275	281,139.65	.....	10,514.04	14.62	29.50	100,347.03	.....	.....	124,979.11
November.....	14,786	279,908.90	\$39.13	7,821.76	.....	5.00	91,465.12	.....	.....	187,456.69
December.....	16,861	304,471.57	112.88	10,038.14	100.20	.....	100,247.62	.....	341.97	162,630.36
1917.											
January.....	14,341	283,235.75	85.87	8,823.48	194.18	56.60	84,729.37	.....	.....	157,959.92
February.....	14,127	399,763.41	95.72	8,074.56	.....	2.35	87,263.22	826.82	324.80	185,290.31
March.....	15,871	391,008.85	207.87	11,329.10	.....	37.00	124,756.71	647.80	371.35	189,197.88
April.....	14,873	361,910.55	217.34	9,818.88	.....	.....	120,403.59	.....	.....	153,748.34
May.....	14,875	340,303.05	376.49	10,039.10	194.18	.....	140,381.13	703.70	.....	193,238.07
June.....	14,825	336,167.05	678.63	13,352.30	.....	132.00	202,166.30	.....	.....	148,674.02
Total.....	173,475	3,782,763.71	1,813.93	120,054.75	1,805.49	618.47	1,367,582.61	3,500.97	1,420.12	1,960,097.67	

¹ Including deposit money orders.

TABLE No. 50.—*Postal service—Statement of audited revenues, fiscal years 1907 to 1917, inclusive.*

Year.	Receipts.						Total revenue.
	Miscellaneous.	Money-order fees.	Interest on money-order funds.	Stamp sales.	Box rents.	News-paper postage.	
1907.....		\$9,832.65		\$54,803.79			\$64,636.44
1908.....		19,309.14		72,708.67		\$0.87	92,018.68
1909.....		21,720.93		74,241.87		85.53	96,048.33
1910.....		22,980.96		83,765.60		81.50	106,828.06
1911.....		23,457.98		82,585.21		28.51	106,071.70
1912.....		22,869.93		87,497.21		144.24	110,531.38
1913.....		23,366.31		100,599.15		318.84	124,284.30
1914.....		19,408.41		90,792.63		463.67	110,664.74
1915.....		13,169.55		75,202.29	\$2,973.65	988.50	92,333.99
1916.....		12,878.29		76,337.08	5,029.50	1,410.39	95,655.26
1917.....	\$1,207.59	12,371.28	\$12,884.57	74,474.98	8,100.00	1,703.89	110,742.31
Total.....	1,207.59	201,385.46	12,884.57	873,008.48	16,103.15	5,225.94	1,109,815.19

TABLE No. 51.—*Postal service—Statement of postal revenues, fiscal year ended June 30, 1917.*

Month.	Receipts.						Total revenue.
	Money-order fees.	Miscellaneous.	Interest on money-order funds.	Stamp sales.	Box rents.	News-paper postage.	
1916.							
July.....	\$952.08	\$100.00		\$5,947.80	\$462.00	\$129.70	\$7,591.58
August.....	852.18	100.00		5,989.64	45.00	128.21	7,115.03
September.....	1,171.16	100.61		5,575.61	1,606.20	114.53	8,568.11
October.....	1,001.56	100.00	\$931.11	5,528.60	375.20	131.96	8,068.43
November.....	1,062.99	100.00	1,055.59	6,073.73	57.85	121.42	8,471.58
December.....	1,224.34	100.00	947.25	8,577.20	1,475.25	128.25	12,452.89
1917.							
January.....	1,005.27	100.02	970.92	6,250.52	595.50	141.26	9,063.49
February.....	918.93	100.00	987.89	5,570.11	33.25	162.61	7,772.79
March.....	1,032.63	100.00	944.55	6,380.49	1,347.50	175.31	9,980.48
April.....	995.77	100.00	4,093.29	5,871.51	694.35	171.58	11,927.50
May.....	1,043.04	100.00	1,489.29	6,215.67	36.25	153.84	9,938.09
June.....	1,110.33	106.96	1,464.68	6,493.50	1,371.65	145.22	10,692.34
Total.....	12,371.28	1,207.59	12,884.57	74,474.98	8,100.00	1,703.89	110,742.31

TABLE No. 52.—*Postal service—Statement of postal savings payments and deposit money-order transactions (in lieu of Postal Savings System) for fiscal year ended June 30, 1917.*

Month.	Postal savings certificates.		Deposit money orders.		
	Balance July 1, 1916.	Paid.	Balance July 1, 1916.	Issued.	Paid.
1916.					
July.....	\$14,301.00	\$736.00	\$350,650.00	\$85,340.00	\$89,430.00
August.....		12.00		81,765.00	84,645.00
September.....		1,000.00		77,045.00	77,475.00
October.....		857.00		82,890.00	77,675.00
November.....		45.00		85,190.00	73,780.00
December.....				93,060.00	81,640.00
1917.					
January.....		160.00		101,475.00	68,845.00
February.....				230,560.00	71,140.00
March.....				203,310.00	105,465.00
April.....				173,620.00	103,085.00
May.....		850.00		137,760.00	121,235.00
June.....		8,872.00		129,830.00	181,700.00
Balance unpaid June 30, 1917.....		1,769.00			696,380.00
Total.....	14,301.00	14,301.00	350,650.00	1,481,845.00	1,832,595.00

TABLE No. 53.—Statement of receipts and disbursements by the bureau of clubs and playgrounds for the fiscal year ended June 30, 1917.

Clubhouses.	Cash on hand July 1, 1916.	Balance on deposit with collector July 1, 1916.	Commissary coupons in transit July 1, 1916.	Receipts July 1, 1916, to June 30, 1917.	Transfers of funds.	Total.	Disbursements July 1, 1916, to June 30, 1917.	Cash on hand June 30, 1917.	Balance on deposit with collector June 30, 1917.	Commissary coupons and meal tickets in transit June 30, 1917.	Total balance available on June 30, 1917.
Ancon.....	\$175.98	\$182.16	.....	\$41,367.15	1 \$1,000.00	\$41,725.29	\$41,463.32	\$220.40	\$41.57	.....	\$261.97
La Boca.....	392.56	1,092.92	.....	29,921.37	.....	31,230.68	29,116.18	326.42	1,058.26	.....	2,114.50
Balboa.....	691.87	1,275.07	.....	57,447.44	.....	59,448.39	56,356.28	1,157.13	1,913.35	21.63	3,092.11
Pedro Miguel.....	14.75	355.60	.....	13,378.50	.....	13,748.85	13,977.93	41.59	1,270.67	.....	1,229.08
Paraiso.....	.....	.....	.....	2,606.44	500.00	3,106.44	2,755.52	256.19	94.73	.....	350.92
Gatun.....	339.92	990.78	.....	30,935.92	.....	32,266.62	28,277.26	178.90	2,777.21	1,033.25	3,989.36
Gatun Silver Club.....	52.46	392.33	.....	16,736.88	.....	17,624.09	16,894.94	141.85	1,177.61	764.91	729.15
Cristobal.....	179.30	143.47	.....	32,170.97	.....	32,493.74	30,472.32	344.01	1,677.41	.....	2,021.42
Cristobal Silver Club.....	.....	.....	.....	3,211.39	1,000.00	4,211.39	1,626.83	64.95	1,894.50	625.11	2,584.56
General secretary's account.....	25.00	192.13	.....	5,768.16	1 500.00	5,485.29	5,233.03	.....	222.25	.....	222.26
Total.....	1,871.84	4,624.46	1,300.26	233,544.22	.....	241,340.78	226,203.61	2,731.44	9,231.01	3,174.72	15,137.17

1 Credits.

TABLE No. 54.—Receipts by the bureau of clubs and playgrounds July 1, 1916, to June 30, 1917.

	Ancon.	La Boca.	Balboa.	Pedro Miguel.	Paraiso.	Gatum.	Gatum Silver.	Cristobal.	Cristobal Silver.	General secretary.	Total.
Memberships.....	\$2,474.00	\$501.82	\$1,907.00	\$1,062.00	\$326.00	\$1,365.75	.....	\$1,069.50	\$32.00	.....	\$8,735.07
Soda fountain.....	17,169.77	12,556.80	20,784.98	5,436.83	970.20	8,332.69	\$6,890.54	16,698.05	2,553.68	.....	91,402.54
Billiards.....	2,806.28	429.95	945.51	349.00	139.05	708.64	567.06	1,263.53	37.44	.....	5,246.51
Bowling.....	2,085.75	120.45	566.14	402.60	.....	1,114.06	.....	601.95	.....	.....	4,800.95
Salable merchandise.....	2,534.74	129.35	6,851.00	256.91	40.30	895.92	.....	415.97	.....	.....	9,124.29
Entertainment.....	1,134.98	4.00	819.10	648.10	222.99	512.95	490.35	248.20	.....	\$39.50	4,120.17
Moving pictures.....	4,094.90	506.09	4,529.13	2,609.41	436.64	4,231.51	934.43	2,754.75	125.47	2,667.27	22,849.60
Library deposits and fines.....	84.10	4.50	124.55	38.50	.....	49.37	.....	24.05	.....	.....	324.87
Activities.....	216.45	.....	233.20	79.50	.....	3.55	.....	1.00	.....	.....	533.70
Pressing Club.....	.....	30.00	1,283.34	.....	.....	.....	.....	.....	.....	.....	1,313.34
Tournaments.....	661.75	.....	1,496.63	97.85	.....	60.00	.....	.....	.....	.....	56,402.73
Cigars and candy.....	12,064.28	14,574.48	10,126.86	2,079.00	448.25	4,321.02	3,714.42	8,780.69	249.20	22.50	56,358.21
Rentals.....	152.15	146.05	116.40	2.75	23.00	83.25	152.00	90.60	39.00	.....	805.20
Balboa Yacht Club.....	.....	.....	2,165.14	.....	.....	.....	.....	.....	.....	.....	2,165.14
Gun Club.....	.....	.....	2,961.89	.....	.....	.....	.....	.....	.....	.....	2,961.89
Tennis club.....	88.00	16.25	177.30	40.75	.....	.....	.....	.....	.....	.....	322.50
Swimming pool.....	.....	.....	3,658.18	.....	.....	.....	54.80	.....	174.60	.....	3,658.18
Playgrounds.....	.....	901.63	.....	.....	.....	.....	.....	.....	.....	.....	1,131.03
Drake service.....	.....	.....	275.30	.....	.....	.....	.....	.....	.....	.....	275.30
Baseball grounds.....	.....	.....	.....	.....	.....	.....	3,924.28	157.63	.....	.....	157.63
Restaurant.....	.....	.....	.....	.....	.....	9,257.20	.....	.....	.....	.....	13,181.48
Interest.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,038.28	3,038.28
Miscellaneous.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.61	.61
Total.....	41,367.15	29,921.37	57,447.44	13,378.50	2,608.44	30,935.92	16,736.88	32,170.97	3,211.39	5,768.16	233,544.22

TABLE NO. 55.—Disbursements by the bureau of clubs and playgrounds July 1, 1916, to June 30, 1917.

	Ancon.	La Boca.	Balboa.	Pedro Miguel.	Paraiso.	Gatun.	Gatun Silver.	Cristobal.	Cristobal Silver.	General secretary.	Total.
Billiards.....	\$333.04	\$332.96	\$393.23	\$376.50	\$52.28	\$157.67	\$147.14	\$776.29	.....	.....	\$2,569.11
Bowling.....	2,061.51	990.58	788.40	783.09	.....	938.11	.....	904.08	.....	.....	6,465.77
Entertainment.....	1,627.73	200.87	1,062.49	899.24	219.33	626.54	379.87	578.87	.....	.....	5,656.26
Moving pictures.....	3,926.98	1,254.43	4,198.01	3,064.79	605.85	4,105.88	1,539.42	3,178.54	.....	.....	27,165.81
Office help.....	1,474.94	336.40	660.90	899.53	109.89	855.54	768.34	987.67	.....	.....	6,135.15
Library books and periodicals.....	140.87	97.01	117.89	128.23	50.10	151.76	.....	20.38	.....	.....	6,721.69
Maintenance and general expense.....	2,738.99	1,682.18	2,415.75	1,214.22	236.29	893.59	1,018.03	918.49	.....	.....	11,347.64
Supplies and equipment.....	1,388.41	360.64	518.28	105.33	335.49	348.42	281.45	168.49	.....	.....	3,562.71
Salable merchandise.....	642.63	184.46	7,309.36	56.35	9.00	765.48	.....	360.45	.....	.....	9,327.73
Soda fountain.....	15,439.39	11,161.96	17,093.44	4,592.90	812.76	6,292.71	6,225.90	14,416.73	.....	.....	77,157.46
Pressing Club.....	.....	.....	1,238.30	.....	.....	.....	.....	.....	1,062.05	.....	1,238.30
Activities.....	1,140.00	1.68	1,143.33	98.50	27.44	836.35	19.34	757.42	.....	.....	4,030.06
Refunds.....	70.75	4.00	1,106.00	30.00	.....	61.85	2.30	27.50	.....	6.00	4,302.40
Tournaments.....	358.36	14.00	404.02	126.18	.....	69.82	.....	47.12	.....	.....	1,019.50
Cigars and candy.....	10,102.49	11,896.16	8,838.69	1,673.02	297.09	3,268.86	2,912.17	7,330.29	.....	.....	46,268.94
Gun Club.....	.....	.....	3,831.69	.....	.....	.....	.....	.....	20.17	.....	3,831.69
Tennis clubs.....	16.06	28.65	193.44	.....	.....	.....	.....	.....	.....	.....	2,238.15
Balboa Yacht Club.....	.....	.....	2,814.85	.....	.....	.....	.....	.....	.....	.....	2,814.85
Swimming tank.....	.....	.....	2,887.83	.....	.....	.....	.....	.....	.....	.....	2,887.83
Playgrounds.....	.....	570.20	.....	.....	.....	.....	.....	.....	45.15	.....	2,067.16
Restaurant.....	.....	.....	.....	.....	.....	8,904.68	51.81	.....	.....	.....	1.17
New buildings.....	1.17	.....	.....	.....	.....	.....	3,549.17	.....	.....	.....	195.81
Baseball grounds.....	.....	.....	195.81	.....	.....	.....	.....	.....	.....	.....	1.17
Manufacture of cigars.....	.....	.....	144.57	.....	.....	.....	.....	.....	.....	.....	144.57
Total.....	41,463.32	29,116.18	56,356.28	13,977.93	2,755.52	28,277.26	16,894.94	30,472.32	1,626.83	5,263.03	226,203.61

TABLE No. 56.—*Statement of amounts paid under the act of May 30, 1908, to employees as compensation on account of deaths of employees injured in the course of employment, and amounts paid under act of Feb. 24, 1909, for injuries lasting 15 days or less; amounts paid under Executive order of Feb. 26, 1913; amounts paid under Executive Order No. 1902, dated Mar. 20, 1914; and amounts paid under act of Sept. 7, 1916, covering period from Aug. 1, 1908, to June 30, 1917.*

Total payments, by fiscal years, to date.	Injuries.	Deaths.	Under act of Feb. 24, 1909.	Total.
Aug. 1, 1908, to June 30, 1909.....	\$32,355.71	\$3,682.79	\$8,225.16	\$44,263.66
July 1, 1909, to June 30, 1910.....	96,810.33	21,053.22	16,010.30	133,873.85
July 1, 1910, to June 30, 1911.....	168,416.23	35,248.39	49,957.80	253,622.42
July 1, 1911, to June 30, 1912.....	166,620.21	37,534.68	55,838.25	259,993.14
July 1, 1912, to June 30, 1913.....	150,943.79	23,792.02	49,335.91	224,071.72
July 1, 1913, to June 30, 1914.....	111,240.75	41,015.34	33,704.92	185,961.01
July 1, 1914, to June 30, 1915.....	17,703.40	14,268.97	.....	31,972.37
July 1, 1915, to June 30, 1916.....	168.00	1,206.00	.....	1,374.00
July 1, 1916, to June 30, 1917.....	.....	545.40	.....	545.40
Total.....	744,258.42	178,346.81	213,072.34	1,135,677.57
Payments under Executive order of Feb. 26, 1913.....	.....	.....	.....	13,227.62
Payments under Executive order of Mar. 20, 1914:	.....	.....	.....	.....
Apr. 1, 1914, to June 30, 1914.....	4,283.82	.....	.....	4,283.82
July 1, 1914, to June 30, 1915.....	41,871.91	43,017.71	.....	84,889.62
July 1, 1915, to June 30, 1916.....	32,341.85	33,321.07	.....	65,662.92
July 1, 1916, to June 30, 1917.....	9,748.10	11,400.95	.....	21,149.05
Payments under provisions of contracts between Panama Canal and contractors.....	334.18	.....	.....	334.18
Payments under special acts of Congress.....	.....	.....	.....	39,418.37
Total.....	.....	.....	.....	1,364,643.15
Amounts paid to Panama Railroad employees:	.....	.....	.....	.....
Apr. 1, 1914, to June 30, 1914.....	770.61	.....	.....	770.61
July 1, 1914, to June 30, 1915.....	10,275.45	2,300.42	.....	12,575.87
July 1, 1915, to June 30, 1916.....	9,056.66	3,330.24	.....	12,386.90
July 1, 1916, to June 30, 1917.....	3,146.70	.....	.....	3,146.70
Payments made by Panama Railroad Co. for injuries occurring prior to Apr. 1, 1914.....	.....	.....	.....	614.60
Payments under act of Congress of Sept. 7, 1916: Sept. 7, 1916, to June 30, 1917.....	15,845.04	13,961.57	.....	29,806.61
Grand total.....	.....	.....	.....	1,423,944.44

TABLE No. 57.—Statement of amounts paid under Executive Order No. 1902, dated Mar. 20, 1914, as compensation to employees injured, and on account of deaths of employees injured while directly engaged in actual work with The Panama Canal and Panama Railroad Co., from July 1, 1916, to June 30, 1917, and statement of amounts paid under act of Sept. 7, 1916, as compensation to employees injured, and on account of deaths of employees injured while in the performance of duty with The Panama Canal and the Panama Railroad Co., from Sept. 7, 1916, to June 30, 1917.

	Payments under Executive order of Mar. 20, 1914.		Payments under act of Sept. 7, 1916.	
	Injury.	Death.	Injury.	Death.
Mechanical.....	\$3,249.35	.....	\$3,271.28	.....
Supply (quartermaster's branch).....	343.00	.....	1,111.93	\$889.95
Supply (subsistence).....	4.91	.....	12.21	.....
Building.....	1,203.84	.....	2,219.72	.....
Fortifications.....	4.62	.....	210.68	.....
Health.....	23.76	\$246.72	136.49	.....
Dredging.....	718.36	7,577.94	1,181.34	9,366.60
Terminals.....	3,037.41	2,712.74	345.20	.....
Transportation.....	7.88	370.09	662.06	.....
Municipal engineering.....	502.77	493.46	1,265.87	.....
Police and fire protection.....	75.00	.....	348.56	.....
Electrical.....	384.60	.....	393.47	.....
Locks.....	139.09	.....	591.92	.....
Meteorology and hydrography.....	.....	.....	37.01	.....
Marine.....	53.51	.....	106.89	2,354.27
Executive.....	.....	.....	1.54	.....
Maintenance of way, Panama Railroad.....	76.05	.....	10.83	.....
Superintendent, Panama Railroad.....	.....	.....	448.81	255.61
Transportation, Panama Railroad.....	162.96	.....	203.97	1,095.14
Colon agency.....	2,450.50	.....	1,737.47	.....
Balboa agency.....	45.24	.....	130.77	.....
Coaling plant.....	119.42	.....	281.46	.....
Engineer of docks.....	104.37	.....	176.23	.....
Commissary.....	129.01	.....	285.58	.....
Pasture clearing.....	53.69	.....	650.56	.....
Mount Hope borrow pit.....	5.46	.....	.....	.....
Local agent.....	.....	.....	23.19	.....
Total.....	12,894.80	11,400.95	15,845.04	13,961.57

TABLE No. 58.—Claims for injuries received during period from July 1, 1916, to June 30, 1917, Panama Canal and Panama Railroad employees.

Period of disability.	Monthly rate of pay.				
	Not more than \$40.	Not more than \$75.	Not more than \$200.	More than \$200.	Total.
More than 3 to 30 days.....	818	86	76	4	1,004
More than 30 to 90 days.....	131	8	9	.....	148
More than 90 days to 1 year.....	25	2	2	.....	29
More than 1 year.....	16	2	3	1	22
Total.....	1,010	98	90	5	1,203

TABLE NO. 59.—Statement of injuries sustained by employees of The Panama Canal and Panama Railroad Company, July 1, 1916, to June 30, 1917, for which compensation was due or claimed under Executive Order No. 1902, dated Mar. 20, 1914, and the United States employees' compensation act of Sept. 7, 1916.

	Department or division.																											
	Mechanical.	Supply, quarters, masters.	Supply, subsistence.	Building.	Fortifications.	Health.	Dredging.	Terminals.	Municipal engineering.	Police and fire protection.	Electrical.	Locks.	Meteorology and hydrography.	Marine.	Executive.	Maintenance of way, Panama Railroad.	Superintendent, Panama Railroad.	Transportation, Panama Railroad.	Colon agency.	Balboa agency.	Coaling plant.	Engineer of docks.	Commissary.	Cattle industry.	Mount Hope borrow pit.	Surveys.	Accounting.	Total.
Injuries reported.....	746	149	14	388	69	59	544	44	293	15	73	111	6	30	3	12	91	55	833	19	87	56	105	242	16	3	5	4,068
Claims for injuries:																												
Filed.....	746	149	14	388	69	59	544	44	293	15	73	111	6	30	3	12	91	55	833	19	87	56	105	242	16	3	5	4,068
Approved.....	250	60	5	161	41	26	149	17	104	7	22	39	1	18	2	2	38	27	204	11	38	34	40	82	5	3	1,445	
Disapproved.....	16	11	3	19	7	2	13	23	23	1	1	4			1	5	5	5	19				6	25		1	172	
3 days or under, no allowance.....	337	52	6	161	17	20	289	8	149	6	37	58	3	10		1	32	17	359	8	44	18	54	133	7	2	1,829	
7 days or under, no allowance.....	143	25		44	3	10	93	19	15	1	12	10	2	1		4	16	6	187		1	2	1	2	4	1	604	
Pending.....				3	1				2		2			2		1	1	1	2				1				39	
Accidental deaths reported.....	2	2		2	2	2	12	2	4							1	1	1	2		1		1	4				30
Claims for deaths:																												
Filed.....	1	2		2	2	2	11	1	2					2		1	1	1	2		1			1				15
Approved.....		2					9		1					1		1	1	1										10
Disapproved.....				1		1	2	1	1							1			2									5
Pending.....	1			1		1								1							1							
Total accidents reported.....	748	151	14	390	69	61	556	46	297	15	73	111	6	32	3	13	92	56	835	19	88	56	106	246	16	3	5	4,407

TABLE No. 60.—*Injuries for the period from July 1, 1916, to June 30, 1917, Panama Canal and Panama Railroad employees.*

Nature of injury.	Noncompensative.		Compensated.				Disapproved.								Total noncompensative.	Total compensated.	Total disapproved.	Total paid annual leave.	Pending.	Total.	
	New act, less than 3 days.	Less than 7 days.	Over 3 to 30 days.	Over 30 to 90 days.	Over 90 days to 1 year.	Over 1 year.	Disability commenced 6 months after injury.	Evidence insufficient to establish claim.	Not directly engaged in actual work.	Disability not result of the injury claimed.	Disability commenced after separation from service.	No legal dependents.	Failed to give notice as required by act.	Intention to cause injury to self or another.							Disability caused by willful misconduct.
Loss of both feet.....									1									1		1	
Loss of 1 foot above ankle.....									1											1	
Loss of sight, 1 eye.....						1															
Loss of 1 thumb.....																					
Loss of 1 finger.....	1	4		2																	
Loss of more than 1 finger.....			2					1													
Loss of parts of thumb or finger.....			3																		
Loss of great toe.....	1	1																			
Loss of other toes.....			1																		
Other permanent disability.....																					
Fracture of thigh.....																					
Fracture of arm above elbow.....	1		2	1					3									1	3	1	
Fracture of leg.....																					
Fracture of patella.....	1	1	2	4	10													16	2	26	
Fracture of forearm.....			4	6	1			2										11	5	2	
Fracture of ribs.....			2															2			
Fracture of foot.....	1		9	11	4					1								24	1	32	
Fracture of clavicle.....																					
Fracture of lower jaw.....	2	3	1															2		20	
Fracture of toes.....	8	16	9		1													10		15	
Fracture of fingers.....																					
Abrasions.....	49	3	14															26	3	39	
Burns.....	65	3	41															52	2	72	
Cuts.....	564	202	333	28	3													58	4	133	
Contusions.....	1	9	8															34	22	53	
Hernia.....	147	94	42	4	1													17	11	32	
Incisions.....	12	6	17	2														47	6	11	
Infections.....	89	6	26	1	2	1												19	11	3	
Injury to eyes.....																		30	6	4	

	217	273	25	1	7	13	1	304	299	21	22	48	694
Locations.....	87	273	25	1	1	1	1	1	299	21	22	48	694
Multiple injuries.....	3	2	21	4	1	2	1	5	25	3	2	1	36
Punctures.....	17	65	93	2	2	10	6	242	97	17	8	16	380
Multiple slight injuries.....	11	8	28	1	1	2	2	17	9	3	3	29	170
Sprains.....	111	8	28	2	4	2	4	119	30	8	9	4	170
Other temporary disability.....	362	127	51	9	1	12	8	489	61	32	3	8	593
Total.....	1	15	1	3	1	3	1	15	10	14	39	14	39
Total.....	1,829	604	1,002	147	33	21	2	2,433	1,203	182	93	196	4,107

TABLE No. 61.—Injuries for the period from July 1, 1916, to June 30, 1917, Panama Canal and Panama Railroad employees.

Character of work at time of injury.	Cause of injury.																												
	Animals (kicks, bites, falls from, etc.).	Blow of hammer or other object.	Caught between two hard bodies.	Collapse of material.	Contact with gear.	Contact with machinery.	Contact with rough edge or surface.	Contact with sharp instruments, splinters, etc.	Deraillment of locomotive or other moving object.	Explosions (boilers, pipes, gases, etc.).	Electric current.	Fall from elevations.	Fall into excavations.	Fall on even surface.	Fall from cars, etc., or other moving body.	Hot metals, inflammable or corrosive substance.	Lifting, pushing, pulling.	Operating hand car.	Struck by flying object.	Struck by moving body (engines, cars, etc.).	Struck by falling body.	Struck by swinging or loose object.	Stepping on nails or other sharp instruments.	Using hand tools or simple instruments.	Vapors, gases, or poisonous substance.	Other causes.	Total		
Aids to navigation.....	1		1			1	1	1				1	1	2	4					2	1	3				1	2	20	
Air and water supply.....		2	3			1	1	1				2	1	2	1					2	1	3					2	16	
Breakwaters and moles.....																												19	
Building construction, repairing, etc.....	2	13	14	8	5	12	16	33	2	1		43	1	16	11	3	7		18	8	64	9	63	19	28	15	372		
Commissary, storehouses, etc.....	1	3	12	1	6	5	13	13		1	1	9	1	1	2	1	4		8	7	52	8	13	9	3	15	186		
Docks, quays, wharves, etc.....		1	4	1	1	1	1	4				1	6	1	5	3	1		3	2	18	5	2	4	2	8	74		
Drilling and blasting.....		1	4			1	1	1				1	5	10	2	4	1		8	2	12	4	2	1		4	44		
Dry docks and coaling plant.....		2	6		2	5	2	3	1			14	5	10	2	4	1		12	2	30	11	10	4	2	12	142		
Electrical installation and operation.....			3	3		2	1	4	6			5	2	4	2	3	2	1			4	2	4	2		5	59		
Excavation, dry, by hand.....																					1					2	3		
Excavation, dry, by machinery.....									1			19	5	49	3	10	6		17	3	60	32	58	17	4	56	449		
Excavations, wet, dredging, sluicing.....	3	8	32	2	6	13	13	33				6	2	2	4	1			9	10	2	10	2	1	3	1	7	74	
Field repairs to equipment, etc.....		7	2		1	5	1	14				6	2	2	3	1				3	6	10	6	4	8	1	5	67	
Fortifications.....	2	1	2			2	2	1		1				4	4	1	3			3	6	10	6	4	8	1	5	77	
Hotels, messes, operation of.....						2	1	1				1		4	1	1				1	2	2	1	1	2	1	1	16	
Inspection, checking, field.....					1	3	42	22	1			30	6	22	14	2	14	3	15	67	400	96	25	3	1	38	900		
Loading and unloading.....	3	4	88	1	1	2	3	6	5	2	2	8	1	2	5	5	7		7	2	15	6	3	13	7	115			
Locks and spillways.....	4	14	18		4	1	4	10	5			5	3	18	7	4	7		17	10	34	12	45	12	1	19	254		
Municipal improvements.....												1		1	1	1				3	150	25	15	30	4	50	604		
Office work, courts, etc.....		38	34	5	12	52	14	12	1	4	1	24	3	34	3	37	20	1	86	9	1	1	1	1	1	2	9		
Plants, manufacturing, and repair.....												1		3	2				2	1	1	1	1	2	3	14			
Policing, fire protection, etc.....	1	1										1		3	2				2	2	1	1	1	2	8	15			
Quarters, operation of.....												2		4	1		3		1	6	4	12	6	2	3	2	58		
Sanitation, field work of.....												2		9	10	1	2			5	6	6	1	4	1	7	62		
Tracks, construction and maintenance.....	1	4	9		1	1	1	3	2			2		1	1		2		3	1	2	2	2	2	3	7	36		
Transportation, railway.....	1	1	10					1				1		1	14	1				1	2	2	2	1	1	5	50		
Transportation, water.....								2				1		1	1					2	2	2	2	2	1	1	12		
Transportation, other.....	1	1	4		3		3	1	15	1		7	1	5	3				1	7	30	7	29	90	1	24	249		
Other characters of work.....	2	2	3		1	1	7	14	1			3	1	14	1				3	3	15	2	6	1	5	12	79		
Pastures and cattle.....	17	1		1	1	1	1	1	1			3	1	14	1											24	249		
Total.....	40	107	258	22	32	108	118	186	45	12	13	194	34	226	78	75	84	6	230	144	943	243	303	256	24	326	4,107		

TABLE No. 62.—Injuries for the period from July 1, 1916, to June 30, 1917, Panama Canal and Panama Railroad employees.

Cause of injury.	Nature of injury.																				Total.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	Loss of both feet.	Loss of 1 foot above ankle.	Loss of sight, 1 eye.	Loss of 1 thumb.	Loss of 1 finger.	Loss of more than 1 finger.	Loss of part of thumb or finger.	Loss of great toe.	Loss of other toes.	Other permanent disability.	Fracture of thigh.	Fracture of arm above elbow.	Fracture of leg.	Fracture of patella.	Fracture of forearm.	Fracture of ribs.	Fracture of foot.	Fracture of lower jaw.	Fracture of toes.	Fracture of fingers.		Abrasions.	Burns.	Contusions.	Hernia.	Incisions.	Infections.	Injury to eyes.	Lacerations.	Multiple injuries.	Multiple slight injuries.	Punctures.	Sprains.	Other temporary disability.	Fatal.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Animals (kicks, bites, falls from, etc.).																								13	2	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE No. 63.—Receipts, issues, and transfers of stores, and purchases delivered to divisions and accountable officials during the fiscal year 1916-17.

Month.	Receipts by—		Issues by—				Purchases to stores, divisions, and accountable officials.
	Purchase.	Transfers.	Manufacture.	Issues.	Transfers.	Sales.	Surveys.
July.....	\$196,325.74	\$233,270.41	\$47,072.04	\$576,778.87	\$164,391.29	\$21,457.66	\$790.09
August.....	600,738.26	282,719.78	50,945.56	654,618.24	212,553.88	23,898.80	2,385.66
September.....	568,996.81	255,188.01	68,230.13	643,200.50	182,496.82	17,961.45	3,172.61
October.....	626,735.21	309,775.56	45,999.30	739,590.02	321,691.85	46,554.14	3,773.58
November.....	561,074.80	302,770.17	76,905.25	635,143.27	237,169.11	43,893.80	2,331.65
December.....	1,271,403.83	428,070.12	36,180.46	747,682.79	367,562.35	35,909.42	13,031.14
January.....	89,234.08	334,321.02	31,081.39	780,982.90	274,336.55	67,250.11	2,821.35
February.....	651,398.24	337,289.17	48,042.58	803,592.11	288,806.66	25,045.19	3,542.70
March.....	778,838.30	422,369.42	54,988.47	730,364.94	329,251.06	61,337.79	11,005.93
April.....	513,608.45	425,486.71	41,153.49	674,894.41	363,743.94	57,893.84	1,171,820.81
May.....	1,095,986.71	761,933.03	101,180.72	1,015,836.09	348,622.63	96,726.92	97,988.68
June.....	396,034.18	319,004.36	69,574.48	794,246.41	202,091.45	51,089.20	444.87
Total.....	8,152,374.71	4,493,147.76	661,303.87	8,797,096.55	3,232,717.39	548,988.32	170,687.12
Regular stock in quartermaster stores, July 1, 1916.....							\$4,428,593.29
Material in hands of divisions, July 1, 1916.....							548,315.04
Obsolete material credited to assets, July 1, 1916.....							126,020.00
Regular stock in quartermaster stores, July 1, 1917.....							6,850,296.82
Material in hands of divisions, July 1, 1917.....							614,474.39
Obsolete material credited to asset accounts, July 1, 1917.....							217,110.25

TABLE NO. 64.—*Comparative statement of store balance, July 1, 1916, and July 1, 1917.*

Quartermaster stores (by comm.).	July 1, 1916.	July 1, 1917.
Comm.		
1. Air-brake material.....	\$35,408.82	\$32,070.04
2. Alcohol.....	3,853.62	8,063.52
3. Alum and other chemicals for filtering water.....	48.92	58.36
5. Asbestos and magnesia and compounds.....		2.25
6. Asphalt, petroleum residue, and mineral tar, pitch and rosin.....	2,363.82	2,371.59
7. Blocks, chain, and tackle.....	5,742.38	8,411.48
8. Boilers, steam.....		372.55
9. Bolts, nuts, rivets, and washers.....	83,850.08	155,650.91
11. Bricks, building, fire and paving.....	8,372.49	11,303.99
12. Brooms, mops, dusters, and scrub brushes.....	3,348.22	5,703.12
13. Building material (not otherwise specified).....	71,748.61	36,396.67
14. Buoys.....	4,912.31	366.40
15. Cars, hand, push, and inspectors', and velocipedes.....	3,780.18	2,363.72
16. Castings, rough—brass and copper.....	39,483.35	46,793.05
17. Castings, rough—iron and steel.....	71,047.15	104,452.56
18. Cement, Portland.....	47,112.32	2,752.72
19. Chain.....	19,301.69	61,818.03
20. Cleanings and toilet supplies.....	4,252.32	10,594.99
21. Construction equipment, accessories, and supplies.....	107,253.72	95,899.91
22. Containers, nonexpansible.....	30,174.83	52,377.52
23. Conveying and lifting equipment, accessories, and parts.....	84,753.75	113,189.56
25. Drafting supplies.....		201.70
26. Drugs, chemicals, vaseline, naphtha, and benzine.....	38,449.83	65,941.91
28. Ejectors, injectors, lubricators, pop valves, blow-off cocks, water gauges, and parts.....	44,276.66	43,933.66
29. Electric current producing equipment, accessories, and parts.....	289,710.37	256,272.39
31. Electricians' supplies (not otherwise specified).....	29.40	61.73
32. Engines, steam, and parts.....		3,379.00
33. Explosives and blasting batteries and parts.....	54,352.53	60,144.55
34. Farm, plantation, and cattle-ranch implements, supplies, and parts.....	760.56	892.68
35. Fire-preventing and fire-fighting equipment, supplies, and parts (not hose).....	1,100.40	994.93
36. Fittings, pipe and valve.....	125,894.81	140,121.29
37. Flags (railroad excluded).....	383.54	376.70
38. Floating equipment (except buoys).....	1,250.48	
39. Floating equipment, parts for.....	415,688.27	707,062.89
40. Forage, feed, and bedding.....	24,909.77	3,725.62
41. Fuel, coal, anthracite.....	5,187.60	0,239.68
42. Fuel, coal, bituminous (except charcoal).....	1,149.95	137,283.65
43. Fuel, crude oil.....		107.30
44. Furnace and foundry supplies, including charcoal and coke.....	56,466.84	101,775.48
45. Furniture and equipment (office) and parts.....	2,745.28	4,735.65
46. Furniture, other.....	3,584.94	27,319.49
47. Gasoline.....	57,592.23	58,070.08
48. Gauges, steam and vacuum.....	738.54	894.99
49. Glass, window, sash and plate.....	6,350.73	9,238.75
50. Glue, gelatine, rubber, and asbestos cement.....	1,298.00	1,998.89
51. Hair, leathers, and moss.....	583.05	428.60
52. Hardware (not otherwise specified).....	105,512.14	154,151.91
53. Harness, saddlers', and other corral equipment and supplies.....	10,221.38	5,079.47
54. Hose.....	60,850.40	37,147.50
56. Instruments, equipment, and supplies, surgical, medical, and laboratory.....	195.49	17,003.43
57. Iron, in pigs.....	16,816.06	1,433.59
58. Iron and steel, in bars and sheets.....	357,700.27	639,471.81
59. Iron and steel, reinforcing.....	37,307.92	162,401.48
60. Ladders and scaffolds.....	489.26	312.89
61. Laundry apparatus, accessories and parts.....		2.70
63. Leather and belting.....	14,977.47	13,816.36
64. Lime, plaster, and clay.....	3,507.96	2,634.10
66. Lumber, pine and fir.....	215,513.25	443,767.38
67. Lumber, fancy.....	57,060.30	59,325.35
69. Metals, in pigs (excepting iron).....	15,102.87	3,636.75
70. Metals, in sheets and bars (excepting iron), and steel.....	56,106.70	78,011.42
71. Meters, current, and parts.....	1,157.82	3,811.13
72. Meters, water, oil, and air.....		1,119.23
73. Nails and spikes.....	20,662.52	49,569.18
74. Office supplies and stationery.....	2,253.74	3,825.33
75. Oilcloth and linoleum.....	311.30	359.98
76. Oils, illuminating.....	2,157.76	173,511.00
77. Oil, lubricating, and greases, graphite, welding, and cutting compounds.....	26,615.53	34,937.46
78. Packing, calking, and gaskets.....	31,600.25	38,462.62
79. Packing receptacles (expensible) and other packing supplies.....		443.18
80. Paints and painters' supplies, putty, varnish, shellacs, linseed oils, drier, filler, white and red lead, etc.....	120,330.77	190,842.46
81. Paper, packing.....	139.93	1523.61
84. Piling.....	2,568.38	1,212.71
85. Pipe and fitting (vitrified).....	3,003.26	6,514.82

¹ Indicates credit balances caused by credit to storehouses for issues of these articles, the charges for which were not received until after closing of books for current fiscal year.

TABLE No. 64.—*Comparative statement of store balance, July 1, 1916, and July 1, 1917—Continued.*

Quartermaster stores (by comm.).	July 1, 1916.	July 1, 1917.
Comm.—Continued.		
86. Pipe and tubing (metal), except boiler tubes.....	\$138,611.66	\$173,787.90
87. Plumbing material (not otherwise specified).....	16,330.56	35,039.41
89. Polishing and abrading supplies.....	6,217.53	7,205.04
90. Printing-plant equipment and supplies (not including paper).....		306.59
91. Production equipment, accessories, and parts.....	35,854.81	49,336.74
92. Pumps, and parts, including electric.....	23,520.29	22,603.35
93. Rails.....	462.59	540.78
94. Recreational equipment, and parts.....	37.02	663.96
95. Refrigerating equipment, accessories, and parts.....	5,300.07	1,109.89
96. Refrigeration supplies.....	764.72	196.64
ROLLING STOCK, PARTS FOR.		
106. Locomotives.....	58,262.50	65,625.93
107. Freight and passenger train cars.....	230,454.22	216,993.33
108. Motor cars (railroad).....		4,796.42
109. Rope.....	106,053.67	72,988.12
110. Rubber products (excepting packing and belting).....	1,563.61	457.44
111. Sashes, doors, blinds, molding, and capping, screening, strips, etc.....	7,293.12	12,263.57
112. Scales, and parts.....	928.02	562.80
113. Scientific equipment, and parts.....	135.37	1,419.01
114. Screening, bronze and copper.....	23,568.30	18,834.91
115. Searchlights, and lighthouse equipment and supplies.....	641.99	614.80
116. Signal material (automatic).....	11,516.84	10,817.20
117. Stone, sand, gravel, and slate.....		86.36
118. Subsistence equipment.....	10,647.37	15,291.33
119. Subsistence supplies.....	2,699.59	400.34
120. Surveying instruments and supplies.....	1,589.39	1,041.11
121. Tanks.....	1,389.92	1,450.00
122. Telegraph and telephone equipment, accessories and parts.....	16,985.14	13,877.54
123. Tents, and parts, flies and tarpaulins.....	2,776.31	1,393.93
124. Thermometers and barometers.....	407.16	610.87
125. Ties, cross and switch.....	331.93	2,329.42
126. Tiles, building.....	883.87	5,326.98
127. Tools, miscellaneous.....	55,300.89	69,758.49
128. Tools, pneumatic and electric.....	31,259.70	30,706.36
129. Track material (other than rails and ties).....	22,932.02	20,570.75
130. Trucks, warehouse, etc.....	1,433.87	522.40
131. Tubes, boiler and condenser.....	38,536.03	40,287.68
132. Vehicles, animal-drawn, accessories, and parts.....	3,954.30	3,093.37
133. Vehicles, motor-drawn bicycles, accessories and parts (railroad motor cars excluded).....	8,911.36	30,933.47
134. Waste.....	7,492.75	12,446.05
136. Wearing apparel and sewing supplies.....	939.46	1,236.09
137. Wire and wire cables.....	95,381.59	130,246.45
138. Wire, covered and coated.....	63,402.18	110,784.09
139. Woven products and fabrics.....	11,134.81	11,344.50
140. Steel, structural.....		107,104.39
141. Lock machinery, and parts.....	203,351.78	164,007.82
143. Obsolete material (including scrap of all kinds).....	32,095.78	50,973.42
144. Fortifications equipment.....		154.00
Total quartermaster stores.....	4,202,859.63	5,582,674.89
Miscellaneous district quartermasters' stores.....	7,572.42	8,006.07
Fuel oil store.....	95,714.60	273,473.73
Medical store.....	56,178.05	88,717.49
Stationery store, basement.....	12,862.16	15,532.35
Printing plant.....	53,406.43	80,580.17
Total.....	4,428,593.29	6,048,984.70

TABLE No. 65.—Supply department, commissary branch—C. i. f. cost of material and supplies sold during the year ending June 30, 1917.

Class.	On hand July 1, 1916.	Purchases. ¹	On hand June 30, 1917.	Sold.
Groceries.....	\$320,907.62	\$2,862,355.47	\$946,811.46	\$2,236,451.63
Hardware.....	100,738.92	232,640.28	126,118.23	207,260.97
Dry goods.....	503,161.26	1,313,398.69	905,564.80	910,995.15
Boots and shoes.....	155,841.52	320,060.66	265,118.95	210,783.23
Cold storage.....	134,985.34	1,882,576.47	167,651.31	1,849,910.50
Tobacco.....	29,738.50	282,656.99	52,574.18	259,821.31
Raw material.....	115,018.18	512,985.03	244,478.02	383,525.19
Total.....	1,360,391.34	7,406,673.59	2,708,316.95	6,058,747.98

¹ Does not include cattle.

PERCENTAGE OF SURCHARGE EARNED ON COST

Class.	Sold.	Earned surcharge.	Percentage earned on cost.
Groceries.....	\$2,236,451.63	\$364,747.23	16.31
Hardware.....	207,260.97	54,621.68	26.35
Dry goods.....	910,995.15	327,449.34	35.94
Boots and shoes.....	210,783.23	99,328.40	27.12
Cold storage.....	1,849,910.50	471,049.83	25.46
Tobacco.....	259,821.31	133,234.94	51.28
Raw material.....	383,525.19	4,806.02	.....
Total.....	6,058,747.98	1,445,625.40	25.56

LOCATION OF PURCHASES.

United States.....	\$6,391,020.91
Foreign.....	509,922.73
Local.....	423,446.86
Panama Canal.....	82,283.09
Central and South American cattle, hogs, poultry.....	811,923.97
Total.....	8,218,597.56

CLASSIFICATION BY COMMODITIES.

Groceries.....	\$2,862,355.47
Hardware.....	232,640.28
Dry goods.....	1,313,398.69
Cold storage.....	1,882,576.47
Tobacco.....	282,656.99
Boots and shoes.....	320,060.66
Raw material.....	512,985.03
Cattle, hogs, poultry.....	811,923.97
Total.....	8,218,597.56

TABLE No. 66.—Supply department, commissary branch. statement showing distribution of sales and selling value for the year ending June 30, 1917.

To Panama Canal.....	\$1,358,107.61
Panama Railroad.....	196,800.15
Individuals and companies.....	183,955.93
United States Government.....	1,477,726.07
Steamships.....	381,602.46
Washington Hotel.....	69,131.33
Coupons (including paid orders).....	4,881,597.58
Gross revenue from sales.....	8,548,921.13

Supplied for equipment:

Commissaries for expense.....	\$174, 179. 01
General expense.....	894. 32
Plants for expense.....	55, 748. 11
Total.....	<u>230, 821. 44</u>
Loss by condemnation, shrinkage, etc.....	124, 520. 93
Loss by clerical errors, pilfering, etc.....	77, 479. 47
Total.....	<u>202, 000. 40</u>
Grand total.....	<u>8, 981, 742. 97</u>

APPENDIX G.

REPORT OF THE EXECUTIVE SECRETARY, EXECUTIVE DEPARTMENT.

BALBOA HEIGHTS, CANAL ZONE, *August 17, 1917.*

SIR: I submit herewith a report covering the work of the executive department during the fiscal year 1917, including a statement of the business transacted by the courts of the Canal Zone, which for administrative purposes only are considered in the executive department.

ORGANIZATION.

The organization of the executive department was continued along the lines indicated in the report for 1916, the organizations as of June 30, 1916, and June 30, 1917, being as follows:

	As of June 30, 1916.	As of June 30, 1917.
General bureau.....	20	16
Timekeeping bureau.....	48	48
Personnel bureau.....	10	11
Record bureau.....	22	23
Correspondence bureau.....	29	22
Property bureau.....	14	15
Bureau of statistics.....		5
Bureau of clubhouses.....	10	9
Motor cars.....	4	3
Joint Commission.....	6	4
Special attorney.....	7	5
Police and fire division.....	163	195
Division of civil affairs.....	58	61
Division of schools.....	45	56
Courts.....	13	14
Total.....	449	487

The increase of 38 employees is accounted for in the police and school forces. Need of extra vigilance at the locks and piers of the canal necessitated the increase in the police force, and the general improvement of the schools and increase in number of pupils made the greater number of teachers necessary.

The bureau of clubs and playgrounds was placed under the supervision of one of the clubhouse secretaries, and the executive work formerly done by the superintendent was assumed by the secretary of the Balboa clubhouse and the executive secretary.

BUREAU OF STATISTICS.

Readjustment of the salary and wage scale as of July 1, 1917, to comply with the law forbidding the payment of more than 25 per cent in excess of compensation for similar services under the Government in continental United States made necessary the temporary detail of two clerks to compile wage data. It became evident that the statistical work on demography, canal navigation, study of commodity distribution of the canal trade, preparation of reports on canal trade and miscellaneous subjects, publication of The Panama Canal Record, comparison of food costs, and wage adjustment could best be done in a separate office. The bureau of statistics was, therefore, formed by placing the employees previously engaged on various classes of this work in one office, and under the direction of an employee who had formerly been engaged on statistical work in the departmental service at Washington.

Records of vital statistics have been collected, and those of deaths have been compiled up to May, 1909. This work will be continued until such records as exist for deaths, births, and marriages on the Canal Zone have been compiled and indexed.

Statistics of canal trade have been greatly improved, especially as relates to commodity classification, and a more accurate method of accounting for immigration and emigration has been placed in operation.

Data of pay for various occupations in the United States have been collected, and a comparison made for as many positions on the canal work as have been found comparable. On these data the wage scale is based. This work is continuous at present because of unsettled labor conditions in the United States.

A comparison of the cost of living in the Canal Zone and the United States was made in January, 1917, based on 24 standard articles of food, and similar data are being compiled in such time as can be spared from the regular work of the bureau, the prices of these foods as reported for the United States by the Department of Labor being compared with prices in effect at the commissaries on the 15th of each month.

Toward the end of the fiscal year the problem of stabilizing the force of casual laborers on the docks at Cristobal was assigned to the bureau of statistics, and this work is in progress.

The form of The Panama Canal Record was changed with the beginning of Volume X, August 3, 1916, from 9 by 11½ inches to 9½ by 6 inches, the size used by the Department of Commerce in its trade reports.

BUREAU OF CLUBS AND PLAYGROUNDS.

Clubs for gold employees were operated at Cristobal, Gatun, Paraiso, Pedro Miguel, Ancon, and Balboa, and for silver employees at Cristobal, Gatun, and La Boca. A new clubhouse was opened at Paraiso on March 31, 1917, and the Cristobal Silver Club on May 5, 1917.

At Balboa a \$25,000 stadium, with baseball park and athletic field, was completed. The games of the Panama Canal League, Twilight League, Sunset League, and various other organizations were played

on these grounds. The grounds were also used for a track meet and military exhibition on July Fourth. The Governor's pennant for the winning baseball team of the Panama Canal League during the last season was won by Ancon.

During the year nine tennis courts connected with the clubhouses were in use, and playground apparatus was installed at Balboa, including roofed sand boxes, swings, slides, seesaws, merry-go-rounds, giant strides, parallel bars, a wading pool, etc., as well as a large shelter house.

The building of the Balboa Yacht Club was continued in use during the year and was used as an anchorage for all pleasure craft, as well as being a social center for community dances in the open-air hall and a meeting place for various social and business gatherings.

The swimming pool of the Balboa Clubhouse was well patronized during the year, and two slides, one at each end of the pool, were installed.

Organizations allied with clubhouses.—Due to the fact that the number of married people in the Canal Zone is on the increase, an effort has been made to render a larger community service. As a result there have been affiliated with the clubhouses a number of social and recreative organizations, among them the Ancon Morning Musicales Club (also in the Federated Women's Clubs of America), the Three Arts Club, the Women's Club of Cristobal, the Girl Scouts, the Camp Fire Girls, Bluebirds, Morning Glory Girls, and Children's Welfare Circle, the Tarpon Club, the Gatun Golf Club, Boy Scouts, Gun Clubs, and the Open Forum.

Clubhouse activities.—Not as many entertainers have been brought down from the United States as usual, but a number passing through here have been engaged at the clubhouses. The number of local entertainments has increased.

Religious services have been held in the clubhouses at towns where there is no union church building.

The number of moving-picture shows has increased, and an average of 224,000 feet of film has been used each week. The following moving-picture features, among others, were brought to the Isthmus: "The Birth of a Nation," "Civilization," and "The Battle Cry of Peace."

A special film exchange was organized which rendered service for the clubhouses, one Army post, and some commercial exhibitors. A free service and equipment were furnished the leper colony at Palo Seco, the Corozal Insane Asylum, and Gamboa stockade. The superintendents of these places report that the motion pictures have given the patients and prisoners a new outlook on life, revealing to them incidents that they never knew existed. There were 11,648,000 feet of film shown during the year.

A notable feature of the work for colored employees outside of the regular clubhouse activities was the garden parties held on local and national holidays. The colored people responded very readily and turned out in great numbers. However, the clubhouse and playground facilities were inadequate for these occasions in most instances.

Enlargement and improvement of the Gatun Silver Clubhouse are needed, as well as of the clubhouse for silver employees at Pedro

Miguel. A clubhouse is also needed for the gold employees at Colon Beach and New Cristobal.

DIVISION OF CIVIL AFFAIRS.

The administration of the posts, customs, shipping matters, local licensing, estates of deceased and insane employees, and immigration was carried on by this division, and details will be found in Tables Nos. 2, 3, and 4 accompanying this report.

BUREAU OF POSTS.

There were 16 post offices in operation during the year, the post office at Fort Grant having been opened July 1, 1916, and made a money-order office on August 16, 1916. The post offices at Fort Randolph and Fort Sherman were designated money-order offices on November 1, 1916.

Collections and disbursements.—Attention is invited to the statement of postal receipts and disbursements (Table No. 2 in the report of the chief of the division, appended). The total revenue for the postal service, including box rents and payments from the Panama Railroad Company and the commissaries, was \$110,741.41, as compared with \$96,855.26 for the preceding year, making an increase in receipts over 1916 of \$13,886.15. The excess of disbursements over receipts was \$49,655.02, as compared with \$44,527.14 in 1916, the increase being due to higher salaries, the establishment of an additional post office, the purchase and installation of lock boxes (about \$6,000), the purchase of an electric motor truck costing about \$3,900, and the general increase in the amount of business handled. The postal service is still burdened with a subsidy to the Panaman Government equivalent to 40 per cent of its total stamp sales, amounting to \$29,789.63 during the last fiscal year. Approximately 58 per cent of the matter handled by the bureau of posts is official matter of The Panama Canal, from which no revenue is received.

Money orders.—There were 173,475 money orders issued during the year, amounting to \$3,782,763.71, on which fees amounted to \$12,371.28. Compared with the preceding fiscal year there was an increase of 2,379 in the number of orders issued, an increase of \$264,539.08 in the amount and a decrease of \$507.01 in the fees collected. The decrease in fees is due to the increased number of deposit money orders issued on which no fee is collected. There was on deposit at the close of the year \$355,097.10 in the form of unpaid money orders issued by and drawn on Canal Zone post offices in favor of the remitter.

Deposit money orders issued during the year had a total value of \$1,481,845, and payments of deposit money orders during the same period aggregated \$1,136.115, leaving a balance on deposit on June 30, 1917, of \$696,380. On June 30, 1917, the balance of old postal savings certificates held by the accounting department amounted to \$1,769.

The total amount on deposit at all post offices on June 30, 1917, was \$1,053,246.10, and the total amount of cash transactions of the bureau of posts for the year amounted to \$6,559,284.59.

In the past the interest received from Canal Zone money-order funds has been covered into the United States Treasury, and no interest was paid on postal-savings certificates or deposit money orders. The following sections were therefore made a part of the act of Congress on August 21, 1916, authorizing the establishment of certain regulations for the Canal Zone:

SEC. 6. That deposit money orders issued in the Canal Zone in lieu of postal-savings certificates in accordance with the rules and regulations heretofore established by the President, or that may hereafter be established by him, shall bear interest at a rate not exceeding two per centum per annum.

SEC. 7. That the interest received from the Canal Zone money-order funds deposited in banks under Canal Zone regulations shall be available to pay the interest on deposit money orders authorized by the preceding section. Such interest shall also be available to pay any losses which are chargeable to the Canal Zone postal service.

When deposit money orders are cashed interest is figured for each full quarter that has elapsed since the date of passage of this act. Interest amounting to \$1,813.93 was paid on deposit money orders cashed up to June 30, 1917.

Registers and parcel post.—In the registry division of the post offices 240,022 parcels and letters were handled. Of this number, 127,417 were dispatched, subdivided as follows: 20,854 domestic letters, 4,243 domestic parcels, 22,994 foreign letters, 2,198 foreign parcels, 73,696 official letters and parcels registered free, and 3,432 letters and parcels reregistered free. Compared with the preceding fiscal year, there was an increase of 2,718 registered letters and parcels dispatched. There were delivered during the year at all post offices 112,605 registered, insured, and C. O. D. parcel-post packages, an increase of 5,449 over the previous year. Ancon and Cristobal as exchange offices handled 61,972 registers, an increase of 4,070 over the previous year.

Customs duties were collected by the Republic of Panama to the amount of \$10,633.96 on 7,844 mail parcels for nonemployees and on prohibited articles imported by employees, as compared with \$9,557.19 on 8,654 parcels during the preceding year.

During the year 13,938 parcels were delivered at Canal Zone post offices on submission of Form PC-1160, as compared with 13,319 during the previous year.

Foreign dispatches and transit United States mail.—Effective November 1, 1916, an agreement was entered into with the United States Post Office Department whereby all transit United States mail and closed foreign mail via the United States destined to the west coast of Central and South America was consigned to the care of the director of posts of the Canal Zone. Formerly this mail was consigned to the British Packet agent at Panama. The change was made on account of investigations and recommendations from this division. When the postal division took over the work it was found that approximately 45 per cent of the mail was being forwarded over the railroad to connect with steamers at Balboa, when this mail could have been placed aboard at Cristobal before the steamer started through the canal. This was in part a useless expenditure of money. Better connections have been made, and from November 1, 1916, to June 30, 1917, the percentage of mails forwarded by rail to Balboa was approximately 14 per cent as against 45 per cent from April 16, 1916, to October 31, 1916.

During the eight months there were received and dispatched a total of 55,678 sacks of transit mail from New York and New Orleans. Of this total, 47,770 sacks originated in the United States and 7,908 sacks in foreign countries. This mail was received from 146 steamers and dispatched to 153 connecting steamers. The handling of this mail by the Canal Zone bureau of posts has saved the United States Post Office Department a large amount of money.

Discontinuance of sea post service.—The New York-Canal Zone branch of the sea post service was discontinued by the United States Post Office Department on January 1, 1917, resulting in increased work at the Cristobal post office. That office was therefore designated an exchange office for the handling of late mail and consignees' mail, which was formerly billed to the sea post clerks and dispatched by them to the Panama exchange office. In addition to this the Cristobal post office makes direct dispatches of mail to the different railway post offices running out of New York and New Orleans, hence the discontinuance of the sea post service has not materially affected the expeditious handling of mail. No increased expense has been incurred by this additional service, except a transportation charge of about \$1,500 per annum for the steamship transportation of mails to the west coast of Central and South America.

Since July 25, 1916, direct dispatches of mail have been exchanged with Australia and New Zealand by steamers of the New Zealand Shipping Co. Occasionally these steamers bring mail for the United States, which is transferred at Cristobal and dispatched to destination by the British Packet agent. The arrangement with the British post-office department for dispatches of parcel post through the Ancon post office to Central and South American countries instead of sending them to New York for dispatch, as formerly, was discontinued, due to the fact that the Cristobal post office was designated on November 6, 1916, as an exchange office for the direct dispatch of all classes of mail to the west coast of Central and South America.

General administration.—In addition to the direction and supervision of post offices and general correspondence pertaining thereto, the office of the director of posts issued 1,003 duplicates of lost or stolen money orders, investigated 151 cases of the loss, rifling, or non-delivery of registered mail, made special investigations for the United States Post Office Department regarding transit mail across the Isthmus, made 23 inspections of post offices, issued 87 numbered circulars of instructions to all postmasters, and made a revision and publication of the Canal Zone Postal Guide January 1, 1917. Formerly it was the custom of the dead-letter section of the bureau of posts to forward all unclaimed mail to the Dead Letter Office at Washington, D. C., for disposal. This resulted in unnecessary delay in the final disposal of such mail of local origin as well as a notable item of expense in paying first-class transportation rates on mail which had already been given proper service. Effective October 1, 1916, this practice was discontinued, and all local unclaimed mail has been opened here and disposed of in accordance with the Postal Laws and Regulations.

During the year there were reported 24 violations of the Postal Laws and Regulations, 8 arrests were made, 2 convictions secured, and 3 cases were pending at the close of the year. Of the foregoing, 5 arrests were made for the rifling and destruction of ordinary mail,

and 1 conviction was secured, the offender being sentenced to 60 days in jail, 2 offenders were found not guilty, and 2 cases were still pending on June 30, 1917. One arrest was made during the year for sending an indecent and obscene letter through the mails. The offender was found guilty and fined \$35. One arrest was made for the forgery of a money order, and the case was still pending on June 30, 1917. There were 6 violations of the Postal Laws and Regulations by sending lottery matter through the mails, and 10 on account of the misuse of the official business envelope. No arrests were made for the violation of the law regarding lotteries, and only one for the misuse of the official business penalty envelope, the offender being released on account of the lack of direct evidence.

BUREAU OF CUSTOMS.

The bureau of customs has been conducted under regulations embodied in Governor's Circular 679 of July 14, 1914, as revised on November 21, 1914. The work is closely allied to that of the marine division, the quarantine service, the division of police, and the Panama Railroad Company, and the bureau of customs cooperates with all those branches in order to avoid unnecessary duplication of work in connection with the handling of shipping and cargoes.

Prohibited aliens.—For several years the bureau of customs was charged with the administration of the President's Executive order of January 9, 1908, extending to the Canal Zone certain Chinese exclusion laws of the Republic of Panama. Much difficulty was experienced in enforcing these laws, particularly because the Government of Panama made frequent changes in its own laws. Section 10 of the act of Congress of August 21, 1916, gives the President authority to make rules and regulations touching the right of any person to enter or remain upon or pass over any part of the Canal Zone. By virtue of this authority the President signed the Executive order of February 6, 1917, published as Governor's Circular 601-60, relating to the exclusion of Chinese, repealing the Executive order of January 9, 1908. Section 8 of this Executive order authorized the Governor of The Panama Canal to establish rules and regulations to more effectually carry out this order, and Circular 714-1 was issued on April 25, 1917, charging the bureau of customs with the exclusion of the Chinese referred to in the Executive order. Although the new arrangement places more work and responsibility upon the customs inspectors, it is proving more satisfactory to all concerned than the former method.

During the fiscal year 480 prohibited aliens arrived at Balboa, and 227 at Cristobal in transit to the Republic of Panama and other countries, making a total of 707. Since the new law became effective the only Chinese persons turned over to the Government of Panama are those whose destination is some point in the Republic. It is customary to check the number of Chinese members of crews before a ship leaves the Canal Zone port, and 215 crews have been so checked during the past fiscal year. Arrangements were started for the building of a suitable house for the detention of transit Chinese.

Opium traffic and smuggling.—There were 10 arrests during the year for attempted smuggling of opium, 7 convictions, 1 acquittal,

and in 1 case the defendant died before coming to trial. There was 1 case pending on June 30, 1917. Two persons were arrested for attempting to smuggle 40 pounds of opium into the Canal Zone, and upon conviction were fined \$75 and \$50, respectively. This punishment seems inadequate for the offense, since the penalty is a maximum fine of \$5,000, a minimum fine of \$50, or imprisonment not exceeding two years, or both such fine and imprisonment. One lot of 14 pounds of opium was discovered in unclaimed freight.

Household inspections and certification of invoices.—During the year there were 380 inspections of household goods and miscellaneous effects of American manufacture, in accordance with the agreement with the United States Treasury Department, covering 4,007 pieces of freight, as compared with 340 inspections and 2,216 pieces of freight in 1916. This work has been exceptionally heavy because of the large number of transfers of Army officers to the United States.

The bureau of customs certifies invoices covering ordinary shipments from the Canal Zone to the United States, using forms identical with those prescribed for certification by American consuls in foreign ports. There were 1,169 invoices thus certified during the year, as compared with 1,126 in 1916.

The act of Congress passed on August 21, 1916, published as Governor's Circular 600-24, provides, in part, as follows:

SEC. 8. That whenever a customs officer of the Canal Zone shall certify an invoice, landing certificate, or other similar document, or shall register a marine note of protest, or shall perform any notarial services he shall be authorized to collect a fee equivalent to the fee prescribed by the United States consular regulations for the same act or service when performed by consular officials.

In accordance with the above the following charges were made effective January 1, 1917, by Governor's Circular 679-1:

Invoice of returned American goods, in triplicate or quadruplicate.....	\$1.00
Certificate of goods purchased by importer, in triplicate or quadruplicate..	2.50
Certificate of goods not purchased by importer, in triplicate or quadruplicate	2.50
Landing certificate, including oaths of master and mate.....	2.50
Declaration of inspected household goods, in triplicate or quadruplicate...	1.00
Certificate to extra copies of invoice or other document (except certificate of inspection), each.....	1.00

Fees for the above services amounted to \$243.50 at Balboa, and \$359.50 at Cristobal.

Movements of vessels.—There has been a large increase in shipping at canal ports during the past year. The total number of vessels entered was 3,718 and the total number cleared was 3,721, as compared with 2,130 entered and 2,123 cleared during the previous fiscal year, an increase of almost 75 per cent. The greatly increased work, as well as the increased work of the deputy shipping commissioners, noted below, has been performed with an increase of force over June, 1916, of one inspector and one messenger.

SHIPPING COMMISSIONER.

The President's Executive order of January 27, 1914, provides that the executive secretary shall "in person, or through one of his assistants, perform the duties of a shipping commissioner," and these duties have been delegated to the division of civil affairs. The chief

customs inspectors are also deputy shipping commissioners. Because of many conflicts of opinion as to the powers of the shipping commissioner in the Canal Zone it became necessary that these powers be clearly defined. The act of Congress approved August 21, 1916, authorizing the establishment of certain regulations for the Canal Zone, provides in section 9 as follows:

Sec. 9. The laws relating to seamen of vessels of the United States on foreign voyages shall apply to seamen of all vessels of the United States at the Panama Canal Zone, whether such vessels be registered or enrolled and licensed, and the powers in respect of such seamen of such vessels bestowed by law upon consular officers of the United States in foreign ports and upon shipping commissioners in ports of the United States are hereby bestowed upon the shipping commissioner and deputy shipping commissioners on the Panama Canal Zone.

In order that adequate provision be secured for the relief and protection of American seamen in the Canal Zone, the annual appropriation act for the Diplomatic and Consular Service includes the Panama Canal Zone with the foreign countries for which money is appropriated for this purpose.

The work of the shipping commissioner and deputies, in addition to the signing on and discharging of American seamen—that is, seamen on American vessels—has to do with the settlement of disputes between masters and members of crews regarding wages, advances, fines, and general treatment. The present war, involving voyages into danger zones, with consequent bonuses and changing of articles, has greatly increased and complicated this work. Masters have been quick to take advantage of the opportunities offered by the canal policy of speedy dispatch of vessels, and it is no uncommon thing for a deputy shipping commissioner to be called at any time during the night to go aboard ship and settle a dispute. No seaman is discharged in the Canal Zone without the consent of a quarantine officer.

Disputes have been settled out of court, with a single exception in which a master was fined in the district court for paying off members of his crew without appearing before a shipping commissioner.

There were 3,745 seamen shipped on American vessels, and 3,430 seamen discharged, as compared with 2,631 shipped and 2,475 discharged during the preceding year. This was an increase of 40 per cent over 1916, and 379 per cent over 1915. The greatly increased work has been performed with an increase of two in the force.

ADMINISTRATION OF ESTATES.

During the year 189 estates of deceased and insane employees of The Panama Canal and the Panama Railroad Company were administered, and there were 22 estates in the course of settlement on June 30, 1917. Of the 189 estates settled, 122 were delivered to the consular or diplomatic representatives, in the Republic of Panama or the United States, of the countries of which the deceased or insane person was a citizen or subject; 50 estates were settled direct with the heirs upon satisfactory evidence of heirship being furnished; 3 estates were settled with administrators; 2 were settled with persons who had been given power of attorney by the heirs, and the net proceeds of 10 estates were used to settle claims against them. One estate was settled with the beneficiaries of a will, and one was repaid

to a man who had recovered his sanity. No estates were escheated during the year. The amount involved in the settlement of the 189 estates was \$8,568.14, of which \$8,373.08 belonged to the estates of deceased employees, and \$195.06 to the estates of six insane persons.

On June 30, 1917, there were 22 open accounts, and 10 additional cases were being investigated in which no money or property had yet been received. The balance in cash on hand and on deposit with the collector was \$5,425.19.

LICENSES AND TAXES.

Motor vehicles and bicycle licenses are issued by the division of civil affairs, as well as permits for hunting and the keeping or carrying of firearms and the peddling of foodstuffs. During the fiscal year 1917 there were 2,323 such licenses and permits issued, of which 1,862 were for motor vehicles, as compared with 2,569 and 1,078, respectively, for the previous year. Motor-vehicle license fees in the Canal Zone had always been considered excessive. By the act of Congress of August 21, 1916, the President is given power, among other things, to make rules for regulating the licenses and taxing the use and operation of all self-propelled vehicles used on the public highways of the Canal Zone. By virtue of this authority the President issued Executive order of September 5, 1916, published as Governor's Circular 601-55, providing motor-vehicle regulations for the Canal Zone and decreasing considerably the previous tariffs. By virtue of the authority contained in this order the Governor entered into agreements with the municipalities of Panama and Colon providing for reduced reciprocal license fees. The sum of \$9,480.80 was collected by this office during the past year for license fees. A complete statement of licenses issued and taxes collected during the fiscal year will be found included in the report of Canal Zone revenues, printed as a table accompanying the auditor's report.

POLICE AND FIRE DIVISION.

Detailed statements of work of the police and fire forces and of the penal work of the The Panama Canal will be found in Tables Nos. 5 to 8, inclusive.

POLICE SECTION.

In order to furnish proper protection to the locks and terminals of the canal the number of first-class policemen was increased from 98 to 119 on July 1, 1916, and on February 4, 1917, 39 additional first-class policemen were employed, mainly as a result of the present war. These men were recruited from the military forces on the Isthmus, and were retired from duty and returned to the Army on March 1, 1917, when the work performed by them was transferred to the Regular troops. Due to the war the work of the entire police force was increased, including a large number of confidential investigations by the detective section in connection with the protection of the interests of the United States on the entire Isthmus of Panama.

Increases of pay were granted to first-class policemen on July 1, 1916, in accordance with new rates established by the Acting Gov-

ernor's Circular 669-1. The old rates of \$80 on appointment, \$90 after six months, \$100 after one year, and \$110 after two years satisfactory service, were changed to \$93 on appointment, \$112.50 after two years, and \$125 after four years satisfactory service. Subsequently increases of pay were granted to officers of the police force by Governor's Circular 669-4, effective March 1, 1917, as follows: Inspector, from \$200 to \$225; captains, from \$160 to \$180; lieutenants, from \$140 to \$160; and sergeants, from \$130 to \$145 per month. Policemen on the silver roll were also granted increases by Governor's Circular 668-8, effective January 1, 1917. The old rates of \$40 on appointment and \$50 after long satisfactory service were changed to \$40 on appointment, \$45 after two years, \$50 after four years, and \$55 after six years satisfactory service.

During the year 68 first-class policemen and 4 colored policemen were appointed, and 58 first-class and 5 colored policemen left the service.

No changes were made in the location of police stations during the year, and it is believed that all stations now in use will have to be maintained in the future.

Continuous guard duty was performed by police officers at Pedro Miguel and Miraflores locks, and three plain-clothes officers were stationed at Gatun locks, which were otherwise guarded by troops.

Motorcycle patrols for the enforcement of automobile and other vehicular speed and operation regulations, and for special emergency police service, were continued throughout the year at Balboa and Cristobal.

Monthly patrols were made of the interior sections of the Canal Zone throughout the year to determine if any new clearings or cultivations were being made, or if new buildings were being constructed by private individuals in the depopulated areas. The special attorney was advised of all cases found and some ejectments were made and houses destroyed, after due notification, on proper authority.

In addition to the usual police work, the plain-clothes officers conducted numerous and extensive investigations in connection with the protection of the canal. Plain-clothes officers effected 219 arrests on misdemeanor and felony charges, of which 148, or 67.58 per cent, were convicted, 46 dismissed, and 25 were disposed of otherwise. Investigations were also conducted of 528 cases which did not require arrest, and many cases in which the defendants could not be found.

The regular course of target practice was continued, 166 officers taking part.

A house-to-house canvass of the population of the Canal Zone was taken by police officers between June 10 and 30, 1917, enumerating the entire civilian population under the general classifications "Americans" and "All others," subdivided to show the number of male employees, and the number of women and children. Details will be found in Table No. 5 accompanying this report.

During the year 4,881 persons were arrested, of whom 4,659 were males and 222 females, an increase of 401, as compared with the previous year. Arrests to the number of 4,255 were made without

warrants, and 626 were made with warrants. A statement is attached showing the number of persons arrested who were convicted, dismissed, and otherwise disposed of on proper authority.

Eight homicides were committed during the year. One offender, Jose del C. Alfaro, was found guilty of manslaughter, having inflicted injuries by an automobile on the Fort Amador Road to Bertha Laterman, a white American girl, 9 years of age, which resulted in her death. He was tried in the district court and sentenced to serve 60 days in the penitentiary. One case was considered justifiable and the defendant discharged by the coroner's jury. Three cases were held to be accidental and unavoidable. Two homicides were committed by military guards, who were tried by court-martial and acquitted.

Seven suicides were committed, three by black females, one by a black male, and two by white Americans.

Eighty-one persons were deported from the Canal Zone, of whom 49 were convicts who had completed terms of imprisonment, and 32 were persons who had been convicted of misdemeanors or who were deemed undesirable.

Coroner's investigations were made in 68 cases of death during the year, of which 30 were due to accidental drownings, 20 to accidental traumatism, and 18 to other causes.

A continuous launch patrol of the harbors of Balboa and Cristobal, Gatun Lake, the Chagres River, and the canal at Gaillard Cut was made during the year.

Thirty-eight convicts were received at the penitentiary during the year, a decrease of 21, as compared with the previous year. The aggregate sentences imposed on convicts amounted to 57 years. Fifty-four convicts completed terms of imprisonment, and were discharged from prison, as compared with 66 for the previous year. These convicts had earned 8 years and $4\frac{1}{2}$ days "good time." At the close of the year 35 convicts remained in custody, as compared with 61 at the close of the previous year.

The convicts were employed during the year on the construction of new roads between New Culebra and Gamboa, on a small farm of about 20 acres adjacent to the penitentiary, and on labor inside the prison and for the maintenance of the prison buildings and grounds. The total value of labor performed by convicts amounted to \$7,237, at 10 cents per hour. The total cost of subsisting and guarding the convicts amounted to \$17,030.05, of which amount \$4,153.45 was expended for subsistence of convicts, \$1,176.65 for subsistence of guards, \$6,641.25 for salaries of officers and guards at the penitentiary, and \$5,058.70 for salaries of officers and guards in charge of convicts on road work. The total value of labor performed by common jail prisoners, at 12 cents per hour, amounted to \$12,879.80, of which amount \$4,940 represents labor performed on roads, \$6,475 janitor services, and \$1,464.80 miscellaneous work done.

Two convicts escaped during the year, and both were recaptured. Two common jail prisoners escaped and have not been recaptured.

Four convicts were pardoned, and a part of the sentence was remitted in four cases, by the Governor for special reasons during the year.

FIRE SECTION.

No change was made in the organization of the fire force as compared with the previous fiscal year. Increases in pay were granted to firemen on July 1, 1916, by the Acting Governor's Circular 669-1. The old rates of \$90 on appointment, \$100 after six months, and \$110 after one year's satisfactory service, were changed to \$100 on appointment and \$112.50 after one year's service. Additional increases for other members of the fire force were granted by Governor's Circular 669-4, effective March 1, 1917, as follows: Inspector, from \$200 to \$225; motor inspector from \$145 to \$152.50; and operators (fire apparatus), from \$120 to \$140 per month.

On June 30, 1917, there were eight volunteer fire companies in the service, with a total of 122 men, all of them being employees of The Panama Canal or Panama Railroad Company. One hundred and four fires and nine false alarms were reported during the year. The total losses from all fires amounted to \$3,190.25, which is considered very small in proportion to the property endangered, which was valued at \$1,044,752. There was a considerable increase in new buildings and structures during the year, which necessitated additional fire protection.

Details of the work performed by the fire division will be found in Table No. 8 accompanying this report.

DIVISION OF SCHOOLS.

The schools opened on October 2, 1916, and closed on June 30, 1917. The average daily attendance for the year was 1,709.2—1,212.6 in the white schools and 493.6 in the colored schools, as compared with 1,501.4—1,065.1, and 436.3, respectively, for the school year ended June 30, 1916.

At the beginning of the school year a teacher of household arts was authorized and appointed, and the position of supervisor of lower grades was reestablished, the former incumbent being reappointed, effective September 16, 1916. The total number of white teachers employed during the year was 52, as compared with 43 during the preceding year. There were 14 colored teachers employed, the same number as during the preceding year.

The usual physical examinations of pupils in the white grade schools were made during the last two weeks of October, and Table No. 9, accompanying this report, taken from the report of the superintendent of schools, shows the results of these examinations. All pupils of white grade schools entering school after the regular examinations are made were required to undergo special examinations by the district physicians. A card for keeping the record of the physical examinations of the pupils during all the years of their attendance in the grade schools was devised.

Physical training in the white schools at Balboa and Ancon was continued under the direction of the physical directors of the club-houses. A complete set of playground apparatus was provided at Balboa by the bureau of clubs and playgrounds, and requisitions are being prepared for playground apparatus for the white schools at

Ancon, Pedro Miguel, Paraiso, Empire, Gatun, and Cristobal, for which purpose the sum of \$3,000 has been authorized.

The teaching of Spanish in the last five grades of the white schools was continued.

The work in industrial training was continued, and to this was added a course in domestic science for the girls. The manual training course consisted of instructions in woodwork, mechanical and architectural drawing, elementary metal work, and foundry practice, the three latter subjects having been introduced during the year.

In the apprentice school the total enrollment as to trades was as follows: Boilermakers 7, blacksmiths 2, cabinetmaker 1, coppersmith 1, draftsman 1, electrician 1, machinists 17, molders 2, pipe fitters 4, plumber 1, patternmaker 1, shipwright 1, ship fitters 3, or a total of 42. The boys apprenticed to various trades in the mechanical division were given special technical instruction, and a considerable number of the students continued their work during the vacation period.

The course in domestic science consisted in the teaching of sewing, cooking, and general household economy. Forty-seven girls in the high school and 120 in the grammar schools were given this instruction and 37 boys in the high school and 63 in the grammar schools were given manual training.

The schools for colored children were conducted in the same manner as in the previous year, instruction being given in all the grammar grades.

A census was taken in March to determine the number of pupils who attended school in the various States and countries before entering the Canal Zone schools and the number of years pupils attended the canal schools. These data are shown in Table No. 9.

Nineteen buildings were used for school purposes during the year—13 for white schools, including 2 type 14 four-family quarters at Balboa (Nos. 1457 and 1489), an apartment in a concrete house (No. 759-B) at Balboa, for household arts work, three rooms in the old Washington House at Colon Beach, and an Army building at Empire, and 6 for colored schools, including an Army building at Empire and the lodge hall at Cristobal.

THE COURTS.

In the district court 126 cases were pending at the beginning of the year, 720 cases were filed, and 652 decided, leaving 194 cases pending on June 30, 1917. Of the cases decided, 77 were civil, 275 probate, and 300 criminal. Court was held both at Ancon for the Balboa division and at Cristobal. There were 128 sessions of court. There were 756 marriage licenses issued by the clerk of the court and 84 deeds recorded. The sum of \$3,997.25 was collected in fines, costs, and fees.

In the magistrate's court for the Balboa subdivision 4 cases were pending at the beginning of the year, 1,750 cases were docketed, and 1,747 cases were settled, leaving 7 cases pending at the close of the year. Of the cases docketed, 72 were civil and 1,678 criminal. Of the criminal cases, 59 were dismissed, 183 were committed to the district court, and there were 1,282 convictions and 154 acquittals. Collections on account of fines and fees amounted to \$6,489.64.

In the magistrate's court for the Cristobal subdivision 4 cases were pending at the beginning of the fiscal year, 2,732 cases were docketed during the year, of which 41 were civil and 2,691 criminal cases, leaving 2 cases pending at the close of the year. The criminal cases resulted in 2,008 convictions, 358 acquittals, 111 sentences suspended, 89 dismissals, and 124 cases were committed to the district court. A total of \$6,792.04 was collected in fees and fines.

SPECIAL ATTORNEY AND DISTRICT ATTORNEY.

The reports of the special attorney and the district attorney are printed as appendices to the Governor's report.

UNITED STATES MARSHAL FOR THE CANAL ZONE.

The office of marshal for the district of the Canal Zone received 633 summons, writs, citations, subpoenas, etc., served 553, and was unable to accomplish 80 for the reason that the persons concerned could not be found. The marshal, or his deputy, was in attendance at district court at Balboa and Cristobal a total of 128 days, and a total of \$7,157.52 was collected and disbursed during the year. Table No. 10, showing the operations of the marshal's office, is appended to this report.

RELATIONS WITH PANAMA.

Negotiations by correspondence or personal conference between the executive secretary and the secretary of foreign relations of the Republic of Panama included, among other things, the following subjects in addition to routine matters:

Removal of embargo on shipments of arms and ammunition consigned to merchants in the cities of Panama and Colon.

Preservation of neutrality of the Canal Zone and the Republic of Panama and treatment of vessels in the service of the entente powers arriving and departing from Canal Zone ports and passing through the canal.

Construction of a small pier at Folks River to furnish facilities for docking small coastwise vessels.

Autopsies performed in the cities of Panama and Colon in cases of sudden death to be inspected by representatives of Santo Tomas Hospital or Colon Hospital in order that a record of the findings may be made.

Protection of Canal Zone ports against the outbreak of infantile paralysis in New York City.

Construction of a garbage incinerator for the city of Panama.

Proposed transfer of a subdivision of Bella Vista from the Panama Land & Development Co. to the Republic of Panama.

The prompt advising of the Mount Hope pumping plant by telephone in cases of fire in the city of Colon in order that arrangements might be made for the necessary water pressure.

Police protection at Panama Railroad stables in the city of Panama and the condemnation of certain private stables for sanitary reasons.

Additional accommodations at Santo Tomas Hospital for persons suffering from tuberculosis.

The regulation of pawnshops in the cities of Panama and Colon.

Cooperation of the Canal Zone bureau of posts in expediting the delivery of mails for the Republic of Panama.

Cancellation of saloon licenses at Gatuncillo, in the Republic of Panama, because of being near supply department plantations and causing trouble among Panama Canal laborers.

The location of quarters within the Santo Tomas Hospital grounds for the chaplain of the institution.

The presentation to the Republic of Panama of an old French relief map of the Canal Zone and certain maps and models of the locks for use in the School of Arts and Trades in the city of Panama.

Revision of maritime regulations in force in Panaman ports.

Ordinance respecting the registration of births, deaths, burials, and disinterments in the cities of Panama and Colon.

The issuance of railroad passes to employees in the service of the Republic of Panama.

Street cleaning and garbage collection in the city of Panama.

The construction of a small duct line for supplying electric current to the proposed new sump pump station of the municipal engineering division in Colon.

The withdrawal from circulation of 2,000,000 Panaman pesos.

Removal of certain canteens from inside the 25-meter restricted area at the boundary line between Cristobal and Colon.

The furnishing of postage stamps in denominations of 12 cents, 15 cents, and 24 cents for use in the Canal Zone.

Transfer of the statue of Christopher Columbus to a site in front of the Hotel Washington in Colon.

Reciprocal license fees on motor cars owned by residents of the Republic of Panama and operated in the Canal Zone and on cars owned in the Canal Zone and operated in the Republic of Panama.

Necessity for fire hydrants in the area lying between the National Institute and B Street in the city of Panama.

Charges assessed against the steamship *San Blas*, owned by the Republic of Panama, for use of the Panama Railroad Company's wharves.

Interference with West Indian employees who wished to go to their work by strikers and nonemployees in the city of Panama, inability of the Panaman police to keep order, and the deportation of certain strike agitators from the Isthmus by the Government of the Republic of Panama.

The importation of articles, for their personal use, by employees of The Panama Canal and the Panama Railroad Company and by the post exchanges operated by the United States Army in the Canal Zone.

Construction by The Panama Canal of certain frame or wooden buildings on Colon Beach.

Handling of Chinese passengers arriving at the port of Balboa and the exclusion of undesirable persons from the Isthmus of Panama.

The lack of enforcement of sanitary regulations in the cities of Panama and Colon.

Amendment to Sanitary Rules and Regulations in connection with the issuance of building permits for buildings in the suburban or unimproved sections of the cities of Panama and Colon.

Police protection for colored employees of the Hotel Washington at Colon.

Police protection for Panama Railroad yard at Panama in order to prevent trespassers and to prevent small boys from jumping on and off moving trains.

Agreement regarding manifests of ships arriving at Canal Zone ports with cargo destined for cities of Panama and Colon.

Withdrawal by The Panama Canal of objections to land grants by the Republic of Panama above the 100-foot contour line around Gatun Lake, but within the 3-mile limit, which land was withdrawn from settlement by Panaman Decree No. 46 of 1912.

The question of commissary privileges for members of the diplomatic corps accredited to the Republic of Panama, and the curtailment of said privileges for nonemployees.

The reconstruction and maintenance of telegraph lines across the Isthmus leased to the Republic of Panama.

Authority to allow the Panama and Colon gas companies to use hydrants in Panama and Colon in connection with the work of repairing sidewalks which were torn up to allow the extension of gas mains.

The deportation of insane patients treated at the expense of the Republic of Panama at the Corozal Hospital for the Insane.

The extinguishing of Toro Point Light as a war measure.

Panaman apprentices at Balboa shops.

Prohibition of the operation of automobiles for hire by Panama Canal employees.

Examination of accounts between The Panama Canal and the Republic of Panama by a representative of the latter.

The selection of a site for a new slaughterhouse in the city of Colon, and the matter of slaughtering animals for Colon consumption in the Cristobal abattoir.

The waiving of pilotage charge against the steamer *San Blas* in connection with its monthly trip to Palo Seco Leper Asylum.

Payment to the Republic of Panama of the cost of printing postage-due stamps, which were sold to collectors.

Installation of sewer and water mains and fire hydrants on account of the opening up of new section of Avenue A, between Thirteenth and West Fifteenth Streets, in the city of Panama.

Epidemic of smallpox at Ancon, Republic of Panama.

Trouble between an employee of the division of municipal engineering and firemen connected with the Calidonia fire station over the use of fire hydrants by the Panaman fire department.

Arrests of Panamans for trespassing in restricted area of Balboa Harbor.

LEGISLATION.

An appendix to the Governor's report contains the acts of Congress affecting The Panama Canal and the Executive orders relating to the Canal Zone.

Respectfully submitted.

C. A. McILVAINE,
Executive Secretary.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

TABLE NO. 1.—Statement of receipts and expenditures of clubhouses for the fiscal year 1917.

Balance on hand July 1, 1916		\$7,796.56
Net receipts:		
Membership	\$8,738.07	
Soda fountain	14,245.08	
Billiards and pocket billiards	2,677.40	
Pressing Club	77.04	
Cigars and candy	10,089.27	
Rentals	805.20	
Tennis clubs	84.35	
Swimming tank	770.35	
Playgrounds	463.87	
Brake service	275.30	
Restaurant	727.63	
Interest	3,038.28	
Miscellaneous	.61	
		41,992.45
Net expenditures:		49,789.01
Bowling alleys	1,574.82	
Entertainment	1,536.09	
Motion pictures	4,276.21	
Office help	6,135.15	
Library books and periodicals	396.82	
Maintenance and general expense	11,347.64	
Supplies and equipment	3,562.71	
Salable merchandise	203.44	
Activities	3,496.36	
Refunds	302.40	
Tournaments	116.77	
Gun clubs	869.80	
Balboa Yacht Club	649.71	
New buildings	1.17	
Baseball grounds	38.18	
Manufacture of cigars	144.57	
		34,651.84
Balance on hand June 30, 1917		15,137.17
Assets, Inventories of merchandise		9,559.02
		24,696.19
Liabilities		19,816.12
Balance available		4,880.07

TABLE NO. 2.—Postal service

RECEIPTS.

	1916	1917
Interest on deposit money order funds		\$12,884.57
Sales of postage stamps and other stamped paper	\$76,337.08	74,474.08
Second-class mail	1,410.39	1,703.89
Money-order fees	12,878.29	12,371.28
Miscellaneous receipts		7.59
Panama Railroad mail	1,200.00	1,200.00
Box rents	5,029.50	8,100.00
Total	96,855.26	110,741.41

DISBURSEMENTS.

	1916	1917
Salaries	\$82,030.55	\$83,121.23
Transportation of mails	24,045.50	25,606.49
Purchase of stamps	27,207.86	30,796.91
Interest on paid deposit money orders		1,813.93
Corral service	2,218.85	1,157.33
Stationery, printing, etc.	2,582.25	2,842.83
Repairs to buildings	1,311.64	240.38
Equipment:		
Furniture and fixtures	488.42	317.75
Lock boxes (including building division charge for setting up)		6,485.77
Automobile delivery truck		3,906.42
Electric light and electrical repairs	460.45	705.07
Miscellaneous	1,036.88	3,402.32
Total	141,382.40	160,396.43

Excess of disbursements over receipts, 1916	\$44,527.14
Excess of disbursements over receipts, 1917	49,655.02

TABLE No. 2.—*Postal service*—Continued.

TOTAL CASH TRANSACTIONS OF CANAL ZONE POSTAL SYSTEM FOR FISCAL YEAR ENDED JUNE 30, 1917.

Total amount of money orders issued.....	\$3, 782, 763. 71
Total fees on money orders issued.....	12, 371. 28
Total amount of money orders paid and repaid.....	1, 490, 061. 32
Interest received on deposit money order funds.....	12, 884. 57
Interest paid on deposit money orders.....	1, 813. 93
Total amount of postal receipts.....	110, 742. 31
Total amount of postal-savings certificates and deposit money orders paid.....	1, 148, 647. 47
Grand total cash transactions.....	6, 559, 284. 59

LETTERS AND PARCELS REGISTERED, BY OFFICES, DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

Name of post office.	Domestic letters registered.	Domestic parcels registered.	Foreign letters registered.	Foreign parcels registered.	Official registered free.	Distribution registered free.	Total.
Ancon.....	5, 913	1, 375	7, 825	1, 484	4, 891	763	22, 251
Balboa.....	2, 055	249	1, 355	52	3, 686	1, 109	8, 506
Balboa Heights.....	1, 257	207	329	9	42, 628	95	4, 525
Corozal.....	458	131	152	43	1, 400	.....	2, 184
Cristobal.....	7, 038	822	11, 070	518	10, 127	728	0, 303
Culebra.....	531	157	238	3	998	117	2, 042
Empire.....	554	356	245	35	862	154	2, 206
Fort Grant.....	354	73	27	.....	244	.....	698
Fort Randolph.....	69	204	1	.....	116	100	490
Fort Sherman.....	231	73	11	1	317	228	861
Gamboa.....	251	.....	150	.....	1, 089	.....	1, 490
Gatun.....	331	111	171	9	1, 611	.....	2, 233
Las Cascadas.....	565	211	158	5	729	123	1, 791
Monte Lirio.....	51	3	29	.....	44	.....	127
Paraiso.....	750	189	989	30	2, 735	15	4, 708
Pedro Miguel.....	446	82	246	9	2, 219	.....	3, 002
Totals.....	20, 854	4, 243	22, 994	2, 198	73, 696	3, 432	127, 417

NUMBER OF INSURED AND C. O. D. PARCEL-POST PARCELS AND REGISTERED ARTICLES DELIVERED, BY OFFICES, DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

Name of post office.	Number of insured and C. O. D. parcels.	Number of registered articles.	Total.	Name of post office.	Number of insured and C. O. D. parcels.	Number of registered articles.	Total.
Ancon.....	4, 384	11, 716	16, 100	Fort Sherman.....	150	595	745
Balboa.....	2, 120	9, 118	11, 238	Gamboa.....	.....	2, 779	2, 779
Balboa Heights.....	1, 661	22, 513	24, 174	Gatun.....	37	3, 511	3, 548
Corozal.....	719	5, 205	5, 924	Las Cascadas.....	564	1, 302	1, 866
Cristobal.....	3, 475	24, 971	28, 446	Monte Lirio.....	9	444	453
Culebra.....	666	1, 508	2, 174	Paraiso.....	381	4, 442	4, 823
Empire.....	697	2, 322	3, 019	Pedro Miguel.....	575	5, 056	5, 631
Fort Grant.....	326	1, 026	1, 352	Total.....	15, 769	96, 836	112, 605
Fort Randolph.....	5	328	333				

NUMBER OF MAIL PARCELS ON WHICH DUTY HAS BEEN PAID TO THE GOVERNMENT OF PANAMA, AND THE AMOUNT OF DUTY AS SHOWN BY RECEIPTS ON FILE, BY OFFICES, DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

Name of post office.	Number of parcels.	Amount of duty.	Name of post office.	Number of parcels.	Amount of duty.
Ancon.....	5, 177	\$6, 623. 17	Fort Sherman.....	.....	.....
Balboa.....	160	164. 52	Gamboa.....	.....	.....
Balboa Heights.....	16	10. 83	Gatun.....	14	\$9. 61
Corozal.....	10	6. 60	Las Cascadas.....	35	21. 74
Cristobal.....	2, 165	3, 363. 90	Monte Lirio.....	2	1. 90
Culebra.....	69	33. 04	Paraiso.....	68	199. 53
Empire.....	84	66. 99	Pedro Miguel.....	39	128. 74
Fort Grant.....	3	2. 01	Total.....	7, 844	10, 633. 96
Fort Randolph.....	2	1. 33			

TABLE NO. 3.—*Statement of vessels entered and cleared and of seamen shipped and discharged at Balboa and Cristobal, fiscal year 1917.*

Month.	Vessels entered.			Vessels cleared.			Seamen shipped.			Seamen discharged.		
	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.
1916.												
July.....	120	165	285	124	171	295	22	273	295	3	220	223
August.....	115	164	279	109	164	273	5	286	291	1	284	285
September.....	127	173	300	135	169	304	1	303	304	6	264	270
October.....	132	190	322	130	191	321	3	247	250	3	244	247
November.....	128	178	306	125	177	302	4	210	214	5	198	203
December.....	130	166	296	134	166	300	6	354	360	7	423	430
1917.												
January.....	165	204	369	164	203	367	5	292	297	2	332	334
February.....	135	151	286	131	154	285	15	334	349	1	316	317
March.....	141	163	304	141	163	304	75	265	340	50	274	324
April.....	138	159	297	140	154	294	35	248	283	24	244	268
May.....	157	176	333	160	173	333	34	322	356	49	118	167
June.....	167	174	341	167	176	343	72	334	406	72	290	362
Total.....	1,655	2,063	3,718	1,660	2,061	3,721	277	3,468	3,745	223	3,207	3,430

TABLE NO. 4.—*Statement showing number of estates received and settled, and amount of funds handled, during fiscal year ended June 30, 1917.*

Month.	Number received.	Number settled.	Amount of funds collected.	Value of estates settled.
Balance of unsettled estates and cash on hand on July 1, 1916.....	28	.....	\$3,227.05	.....
1916.				
July.....	14	30	225.28	\$711.46
August.....	13	15	697.50	408.77
September.....	11	11	230.05	699.58
October.....	11	2	543.08	5.53
November.....	12	14	158.72	350.30
December.....	16	9	429.79	339.28
1917.				
January.....	14	9	4,249.33	175.46
February.....	29	23	1,750.59	1,332.64
March.....	24	35	1,010.74	2,072.76
April.....	10	11	517.00	1,455.85
May.....	12	14	456.31	169.19
June.....	17	16	1,824.90	847.32
Total estates and cash handled.....	211	189	15,320.34	8,568.14

Number of unsettled estates on hand June 30, 1917..... 22
 Balance of cash on deposit on June 30, 1917..... \$5,425.19

TABLE NO. 5.—*Police section.*

POLICE FORCE AS ON JUNE 30, 1917.

Official title.	Authorized force.	Actual force.	Official title.	Authorized force.	Actual force.
Police inspector.....	1	1	First-class policemen.....	119	113
Captains.....	3	3	Policemen (colored).....	30	32
Lieutenants.....	5	5			
Sergeants.....	12	12	Total.....	170	166

TABLE No. 5.—*Police section*—Continued.

DISTRIBUTION OF POLICE FORCE BY STATIONS AND SUBSTATIONS.

Stations and substations.	Actual force.		Stations and substations.	Actual force.	
	On July 1, 1916.	On June 30, 1917.		On July 1, 1916.	On June 30, 1917.
Headquarters.....	2	3	Cristobal central station.....	38	46
Detective force.....	4	7	Gatun.....	15	14
Balboa central station.....	40	37	Monte Lirio.....	1	1
Ancon.....	9	14	Gamboa.....	1	1
Pedro Miguel.....	33	30	Penitentiary.....	14	13
			Total.....	157	166

Average actual force available for general duty.....	86
Average number on special duty per month.....	76.5
Average number sick per month.....	1.66
Average number on leave per month.....	8.23
Average number suspended per month.....	0

Number of white American officers appointed during year.....	68
Number of colored officers appointed during year.....	4

Total..... 72

Number of separations of white American officers during year.....	58
Number of separations of colored officers during year.....	5

Total..... 63

Thirty white American officers were fined during the year.....	\$231.00
Four colored officers were fined during the year.....	15.00

Total..... 246.00

NUMBER OF ARRESTS, BY FISCAL YEARS, MADE ON CANAL ZONE SINCE ORGANIZATION.

Period.	Arrests.	Period.	Arrests.
June 2, 1904, to June 30, 1905.....	2,130	July 1, 1912, to June 30, 1913.....	6,827
July 1, 1905, to June 30, 1906.....	3,748	July 1, 1913, to June 30, 1914.....	4,911
July 1, 1906, to June 30, 1907.....	5,831	July 1, 1914, to June 30, 1915.....	5,157
July 1, 1907, to June 30, 1908.....	6,075	July 1, 1915, to June 30, 1916.....	4,480
July 1, 1908, to June 30, 1909.....	6,275	July 1, 1916, to June 30, 1917.....	4,881
July 1, 1909, to June 30, 1910.....	6,947		
July 1, 1910, to June 30, 1911.....	5,959	Total.....	70,276
July 1, 1911, to June 30, 1912.....	7,055		

NUMBER OF ARRESTS, BY MONTHS, MADE DURING FISCAL YEAR ENDED JUNE 30, 1917.

Month.	Male.	Female.	Total.	With warrant.	Without warrant.
1916.					
July.....	337	23	360	58	302
August.....	384	39	423	66	357
September.....	350	10	360	45	315
October.....	421	6	427	54	373
November.....	346	24	370	41	329
December.....	323	19	342	54	288
1917.					
January.....	356	22	378	55	323
February.....	403	24	427	55	372
March.....	350	11	361	61	300
April.....	382	13	395	43	352
May.....	523	10	533	45	488
June.....	484	21	505	49	456
Total.....	4,659	222	4,881	626	4,255

TABLE No. 5.—*Police section*—Continued.

STATEMENT OF DISPOSITION OF PERSONS ARRESTED, FISCAL YEAR ENDED JUNE 30, 1917.

Disposition.	Number.	Per cent.
Tried in courts:		
Convicted.....	3,469	81.07
Dismissed.....	760	17.76
Continued on June 30, 1917.....	50	1.17
	4,279	100.00
Otherwise disposed of on proper authority.....	602	
Total persons arrested.....	4,881	

NUMBER OF PRISONERS IN CUSTODY IN COMMON JAILS AT THE CLOSE OF EACH MONTH DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

Month.	Prisoners.	Month.	Prisoners.
1916.		1917.	
July.....	81	January.....	72
August.....	60	February.....	58
September.....	67	March.....	69
October.....	92	April.....	73
November.....	119	May.....	33
December.....	61	June.....	98

Average number in jail during year, 73.58.

VALUE OF LABOR PERFORMED BY COMMON JAIL PRISONERS CONFINED DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

Stations.	Number of hours.				Amount at 10 cents per hour.
	Road work.	Janitor work.	Miscellaneous.	Total hours.	
Balboa central station.....	576	26,502	212	27,290	\$2,729.00
Ancon.....		5,336		5,336	533.60
Balboa fire station.....		1,460		1,460	146.00
Pedro Miguel.....	48,824	10,376	528	59,728	5,972.80
Gatun.....		5,616	9,933	15,549	1,554.90
Cristobal.....		13,508	3,975	17,483	1,748.30
Cristobal fire station.....		1,952		1,952	195.20
Total.....	49,400	64,750	14,648	128,798	12,879.80

ANIMALS IMPOUNDED AND FEES COLLECTED DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

Number of horses impounded.....	96
Number of mules impounded.....	15
Number of cattle impounded.....	22
Total.....	133
Total fees collected, \$261.10.	

TABLE No. 5.—*Police section*—Continued.

HOUSE-TO-HOUSE CANVASS OF THE POPULATION OF THE CANAL ZONE TAKEN BETWEEN JUNE 10 AND 30, 1917, BY THE POLICE AND FIRE DIVISION.

[Not including military population.]

BALBOA DISTRICT.

Location.	Americans.		All others.		Americans.		All others.		Total.
	Men.	Em- ployees.	Men.	Em- ployees.	Women.	Child- ren.	Women.	Child- ren.	
Ancon.....	465	464	154	154	261	231	43	10	1,164
Ancon Hospital—									
Doctors.....	22	22							22
Nurses.....	1	1			61				62
Patients (except soldiers).....	73	44	215	176	13	14	65	43	423
Attendants.....			80	80			12	2	94
Tivoli Hotel.....	30	13	4		10	6	4		54
Rural district.....			19	11			13	23	55
Balboa Heights.....	191	167	10		159	205	71		636
Petrolia.....	3		2				2	1	9
La Boca.....	46	46	947	947	46	56	477	826	2,398
Quarantine station.....	3	3	15	15	4	2			28
Balboa Harbor.....			1				2	1	4
Floating equipment.....	17	17	208	208					225
Palo Seco.....	1	1	15	15	1		6		23
Patients.....	2		44		2		16		64
Rural district (east and west of canal to Coro- zal).....			2				2	3	7
Supply department— Venado plantation.....			2	2			1		3
Balboa.....	1,132	1,132	73	73	644	828	81	1	2,759
Corozal.....					6	6			12
Asylum—									
Doctors.....	3	3							3
Nurses.....	3	3			4				7
Patients.....	6		199		2		141		348
Attendants.....			82	82			13		95
Rural district.....			6	5			5	11	22
Miraflores.....	12	12	15	15	1	1	17	35	81
Supply department— Pasture camp, Mi- rafleres dump....	1	1	44	44					45
Pedro Miguel.....	239	238	65	27	178	164	27	2	675
Red Tank.....			522	522			325	455	1,302
Rural district (east and west of canal to Culebra and Gold Hill).....			17	16			2		19
Supply department— Pasture camp west of pontoon bridge....	1	1	83	83					84
Paraiso.....	183	183	99	99	77	103	95	147	704
Jamaicatown.....			280	234			188	182	650
Labor camps.....			310	310					310
Floating equipment.....	27	27	141	141					168
New Culebra.....			10	10			4	5	19
Rural district (Gold Hill to Gamboa, east side of canal)...	3	3	34	32			12	12	61
Supply department— Pasture camp, locomotive shed Las Cascadas plantation.....	1	1	120	120					121
La Pita.....			27	27	1	2	1		32
Gamboa (south of Cha- gres River).....	3	3	152	152	2		54	62	273
Gamboa stockade....	5	5	43	6			4	3	55
Culebra.....	6	6	5	2	4	2	3	2	22
Golden Green.....			138	15			106	138	382

TABLE No. 5.—*Police section*—Continued.

HOUSE-TO-HOUSE CANVASS OF THE POPULATION OF THE CANAL ZONE TAKEN BETWEEN JUNE 10 AND 30, 1917, BY THE POLICE AND FIRE DIVISION—Continued.

BALBOA DISTRICT—continued.

Location.	Americans.		All others.		Americans.		All others.		Total.
	Men.	Em- ployees.	Men.	Em- ployees.	Women.	Child- ren.	Women.	Child- ren.	
Empire.....	9	9	144	42	6	5	122	140	426
Lirio Camp.....			55	55			63	99	217
Cerro Camp.....			110	109			53	96	259
Las Cascadas.....	1	1							2
Martinique Camp.....	3	3	79	41	3	4	76	87	252
Supply department— Mandingo pas- ture camp.....	1	1	110	110					111
Bas Obispo pas- ture camp.....	1	1	56	56					57
Total em- ployees.....		2,412		4,056					
Total per- sons.....	2,495		4,757		1,487	1,629	2,110	2,386	14,864

CRISTOBAL DISTRICT.

Gamboa (north of Cha- gres River).....	18	17	5	5	4	4			31
Floating equipment.....	8	8	82	82					90
Darien.....			8	8					8
Frijoles.....	2	2	14	14	1	4	12	14	47
Supply department— plantation.....			33	33			2	2	37
Monte Lirio.....	3	3	23	23	2	1	14	12	55
Supply department— Pasture camp.....	1	1	18	18					19
Gatun.....	212	209	49	49	180	200	28	3	672
Labor camps.....	2	2	273	272			129	207	611
New Gatun.....	2	2	553	548	1	1	308	366	1,231
Supply depart- ment— Boca Mindi plantation.....	2	2	32	32			1		35
Bracho planta- tion.....			2	2					2
Mount Hope.....	18	17	8	7	9	16	6	3	60
Rural district.....	7	7	39	28	3		18	17	84
Supply depart- ment— Puerto Escon- dido planta- tion.....			5	5			1		6
Maragual pas- ture camp and planta- tion.....	3	3	58	58	1	3	3	7	75
Cristobal.....	688	688	42	41	194	196			1,120
Folks River.....	6	3	479	437	5	3	312	409	1,214
Camp Bieri.....	16	16	2,190	2,190	2	5	35	62	2,310
Rural district (Ga- tun to Caribbean) Supply depart- ment—Sweet- water plantation.....			8	8					8
			2	2			2	1	5
Total employees.....		980		3,862					
Total persons.....	988		3,923		402	433	871	1,103	7,720

TABLE No. 5.—*Police section*—Continued.

HOUSE-TO-HOUSE CANYASS OF THE POPULATION OF THE CANAL ZONE TAKEN BETWEEN JUNE 10 AND 30, 1917, BY THE POLICE AND FIRE DIVISION—Continued.

POPULATION OF GATUN LAKE AREA.

[Within the Canal Zone.]

Location.	Americans.		All others.		Americans.		All others.		Total.
	Men.	Em- ployees.	Men.	Em- ployees.	Women.	Child- ren.	Women.	Child- ren.	
Upper Chagres.....	.....	.....	7	7	.....	.....	3	9	19
Gatuncilla.....	2	2	12	.....	.....	.....	11	18	43
Supply depart- ment—	.....	.....	.....	.....	.....	.....	.....	.....	.....
Juan Mina plan- tation.....	2	2	96	96	.....	.....	5	12	115
Limon planta- tion.....	2	2	420	420	.....	.....	2	5	429
Trinidad River.....	2	.....	1	1	1	1	2	.....	7
Total employees.....	.....	6	.....	524	.....	.....	.....	.....	.....
Total persons.....	8	.....	536	.....	1	1	23	44	613

PRISONERS.

Balboa.....	2	.....	16	.....	.....	.....	1	.....	19
Ancon.....	.....	.....	9	.....	.....	.....	.....	.....	9
Pedro Miguel.....	.....	.....	28	.....	.....	.....	.....	.....	28
Gamboa.....	.....	.....	1	.....	.....	.....	.....	.....	1
Monte Lirio.....	.....	.....	1	.....	.....	.....	.....	.....	1
Gatun.....	.....	.....	2	.....	.....	.....	.....	.....	2
Cristobal.....	1	.....	37	.....	.....	.....	.....	.....	38
Total persons.....	3	.....	94	.....	.....	.....	1	.....	98

RECAPITULATION.

Balboa district.....	2,495	2,412	4,757	4,056	1,487	1,629	2,110	2,386	14,864
Cristobal district.....	988	980	3,923	3,862	402	433	871	1,103	7,720
Gatun Lake area (with- in Canal Zone).....	8	6	536	524	1	1	23	44	613
Prisoners.....	3	.....	94	.....	.....	.....	1	.....	98
Total employees.....	.....	3,398	.....	8,442	.....	.....	.....	.....	.....
Total persons.....	3,494	.....	9,310	.....	1,890	2,063	3,005	3,533	23,295

TABLE No. 6.—*Warden section*.

CONVICTS RECEIVED AT PENITENTIARY DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

Month.	Number received.	Aggregate sentences.		Month.	Number received.	Aggregate sentences.	
		Years.	Months.			Years.	Months.
1916.				1917.			
July.....	5	3	9	January.....	1	1	
August.....	6	32	10	February.....	6	6	4
September.....	1		9	March.....	3	1	
October.....	2		10	April.....	2	1	1
November.....	4	2	9	May.....	1	2	
December.....	6	4	4	June.....	1		4
Total.....				38 57.....			

TABLE NO. 6—Warden section—Continued.

CONVICTS DISCHARGED FROM PENITENTIARY DURING FISCAL YEAR ENDED JUNE 30, 1917.

Month.	Number dis- charged.	Aggregate sentences served.			Good time earned.		
		Years.	Months.	Days.	Years.	Months.	Days.
1916.							
July.....	10	6	1	26.5		7	3.5
August.....	2	1	4	15.0		1	15.0
September.....	4	2	1	26.0		2	4.0
October.....	1	4	9		2	3	
November.....	7	4	1	9.0		3	21.0
December.....	5	7	9	5.0	1	8	25.0
1917.							
January.....	3	3	3	9.5		5	20.5
February.....	2	1		4.5		3	25.5
March.....	4	7	8	5.0	1	3	25.0
April.....	5	2	10	3.0		1	27.0
May.....	7	3	6	15.0		2	15.0
June.....	4	3	10			4	1.0
Total.....	54	48	5	28.5	8		4.5

Number of convicts in penitentiary July 1, 1916.....	51
Number received during fiscal year ended June 30, 1917.....	38
Number discharged during fiscal year.....	54
Number of convicts in confinement on June 30, 1917.....	35

CRIMES COMMITTED BY CONVICTS CONFINED IN PENITENTIARY ON JUNE 30, 1917,
AND THEIR AGGREGATE SENTENCES.

Crime.	Number.	Years.	Months.
Assault with deadly weapon.....	1	1	.....
Assault with deadly weapon and grand larceny.....	1	.....	10
Assault with intent to commit rape.....	2	4	6
Bringing stolen property into Canal Zone.....	2	1	9
Burglary, first degree.....	4	12	.....
Burglary, first degree, and grand larceny.....	2	2	8
Burglary, second degree.....	1	.....	6
Burglary, second degree, and grand larceny.....	3	4	.....
Forgery.....	1	2	.....
Forgery and false and fraudulent representation.....	1	1	3
Grand larceny.....	3	1	10
Manslaughter.....	2	10	.....
Mayhem.....	1	3	6
Murder, first degree.....	2	(1)	.....
Murder, second degree.....	6	112	.....
Rape.....	2	12	.....
Robbery.....	1	1	6
Total.....	35	171	4

1 Life.

NATIONALITY OF THE CONVICTS CONFINED IN THE PENITENTIARY ON JUNE 30, 1917.

Native of—	Number.	Native of—	Number.
Chile.....	2	British West Indies—Continued.	
Colombia.....	4	Trinidad.....	1
Cuba.....	1	Turks Island.....	1
British West Indies:		French West Indies:	
Antigua.....	1	Guadeloupe.....	1
Barbados.....	5	Martinique.....	1
Grenada.....	1	Mexico.....	1
Jamaica.....	3	Panama.....	9
New Providence.....	1	Salvador.....	1
St. Kitts.....	1		
St. Lucia.....	1	Total.....	35

TABLE No. 6.—*Warden section*—Continued.

SENTENCES OF CONVICTS CONFINED IN PENITENTIARY ON JUNE 30, 1917.

Range of sentences.	Black.	Range of sentences.	Black.
Life imprisonment.....	2	1 year and over.....	11
10 years and over.....	6	Less than 1 year.....	4
5 years and over.....	6	Less than 6 months.....	2
3 years and over.....	1		
2 years and over.....	3	Total.....	35

VALUE OF THE LABOR PERFORMED BY CONVICTS EMPLOYED ON PUBLIC IMPROVEMENTS (EMPIRE-GAMBOA ROAD) AND VALUE OF LABOR OF CONVICTS ASSIGNED TO INSIDE LABOR AT THE PENITENTIARY DURING THE FISCAL YEAR ENDED JUNE 30, 1917.

Month.	Value of work performed.	Value of inside labor.	Month.	Value of work performed.	Value of inside labor.
1916.			1917.		
July.....	\$661.70	\$4.00	January.....	\$563.20	\$25.60
August.....	693.60	6.40	February.....	523.00	28.00
September.....	666.20	3.40	March.....	728.80	26.40
October.....	632.70	8.10	April.....	558.00	29.00
November.....	543.20	12.20	May.....	496.30	17.20
December.....	524.10	56.20	June.....	403.90	20.80
			Total.....	6,999.70	237.30

The inside labor consisted of miscellaneous repairs to horse equipment for police and fire stations, repairing uniforms of Zone prisoners, and repairing mail sacks for the Canal Zone postal service, but does not include labor performed in maintaining small penitentiary farm.

COST OF SUBSISTING, GUARDING, AND CLOTHING CONVICTS CONFINED IN THE PENITENTIARY DURING FISCAL YEAR ENDED JUNE 30, 1917.

Month.	Subsistence.		Salaries of officers and guards.		
	Convicts.	Guards.	Penitentiary.	Road work.	Total.
1916.					
July.....	\$382.29	\$103.10	\$516.00	\$518.00	\$1,519.39
August.....	361.57	101.67	572.66	420.08	1,455.98
September.....	388.44	105.06	514.76	425.00	1,433.26
October.....	334.43	92.12	530.80	422.15	1,379.50
November.....	353.27	104.38	536.83	425.00	1,419.48
December.....	338.70	100.31	509.13	423.67	1,371.81
1917.					
January.....	328.68	92.64	548.95	422.89	1,393.16
February.....	296.35	89.59	567.43	464.47	1,417.84
March.....	385.30	97.61	566.76	405.77	1,455.44
April.....	368.75	99.40	618.00	377.00	1,463.15
May.....	343.27	98.95	523.33	402.84	1,368.39
June.....	272.40	91.82	636.60	351.83	1,352.65
Total.....	4,153.45	1,176.65	6,641.25	5,058.70	17,030.05

CONVICTS AND COMMON JAIL PRISONERS DEPORTED DURING FISCAL YEAR ENDED JUNE 30, 1917.

Deported to—	Convicts.	Zone prisoners.	Total.	Deported to—	Convicts.	Zone prisoners.	Total.
Colombia.....	2	2	4	French West Indies:			
England.....		1	1	Guadeloupe.....		1	1
British West Indies:				Martinique.....	2	2	4
Barbados.....	13	8	21	Panama.....	16	2	18
Dominica.....		1	1	Peru.....	2	1	3
Fortune Island.....	1		1	Spain.....	1	1	2
Grenada.....	1		1	United States.....	5	6	11
Jamaica.....	5	7	12	Porto Rico.....	1		1
				Total.....	49	32	81

TABLE No. 7.—*Coroner Section.*

DEATHS, BY MONTHS, INVESTIGATED BY CORONER DURING FISCAL YEAR ENDED JUNE 30, 1917.

Month.	Number.	Month.	Number.
1916.		1917.	
July.....	4	January.....	9
August.....	5	February.....	8
September.....	6	March.....	5
October.....	3	April.....	3
November.....	9	May.....	3
December.....	7	June.....	6

Total deaths, 68.

CAUSES OF DEATHS INVESTIGATED BY CORONER DURING FISCAL YEAR ENDED JUNE 30, 1917.

Causes.	Number.	Causes.	Number.
Accidental drowning.....	30	Natural causes.....	2
Accidental traumatism.....	20	Rupture of aorta.....	1
Accidental electric shock.....	1	Suicide.....	7
Accidental fall.....	2	Tertiary syphilis.....	1
Accidental fracture.....	1	Total.....	68
Gunshot wounds.....	2		
Heart disease during personal altercation.....	1		

TABLE No. 8.—*Fire section.*

FIRE PERSONNEL AS ON JUNE 30, 1917.

Designation.	June 30, 1917.		Designation.	June 30, 1917.	
	Author-ized.	Actual.		Author-ized.	Actual.
Fire inspector.....	1	1	Operators (fire apparatus).....	5	5
Captains.....	2	2	Firemen.....	29	28
Lieutenants.....	6	5	Total.....	44	42
Motor inspector.....	1	1			

DISTRIBUTION OF FIRE PERSONNEL, BY STATIONS, JUNE 30, 1917.

Stations.	Total paid force.	Total volun-teers.	Total.	Stations.	Total paid force.	Total volun-teers.	Total.
Headquarters.....	1	.....	1	Cristobal Central station.....	13	.....	13
Balboa Central station.....	9	.....	9	Gatun substation.....	7	20	27
Ancon substation.....	9	.....	9	Gamboa.....	.....	21	21
Corozal.....	.....	18	18	Monte Lirio.....	.....	2	2
Pedro Miguel station.....	2	40	42	Frijoles.....	.....	2	2
Paraiso substation.....	1	19	20	Total.....	42	122	164

Number of firemen appointed during the year..... 24
 Number of separations from the service..... 20

TABLE No. 8.—*Fire section*—Continued.STATEMENT OF DAMAGE RESULTING FROM FIRES DURING THE FISCAL YEAR ENDED
JUNE 30, 1917.

Month.	The Panama Canal.	Panama Railroad.	Private property in the Canal Zone.	Total.
1916.				
July.....	\$75.00			\$75.00
August.....	100.00			100.00
September.....	12.00	\$50.00		62.00
October.....				
November.....	2.00			2.00
December.....	500.75	35.00	\$5.00	540.75
1917.				
January.....	525.00		580.00	1,105.00
February.....	7.00		100.00	107.00
March.....	361.00	107.00	3.00	471.00
April.....	422.50			422.50
May.....				
June.....	300.00		5.00	305.00
Total.....	2,305.25	192.00	693.00	3,190.25

STATEMENT OF PROPERTY INVOLVED IN FIRES DURING THE FISCAL YEAR ENDED
JUNE 30, 1917.

Month.	The Panama Canal.	Panama Railroad.	United States Army.	Private property in the Canal Zone.	Total.
1916.					
July.....					
August.....	\$150,247.50				\$150,247.50
September.....	1,050.00	\$50.00			1,100.00
October.....	61,573.00	5,300.00			66,873.00
November.....	146,750.00				146,750.00
December.....	107,250.00	2,000.00		\$20,500.00	129,750.00
1917.					
January.....	125,850.00			2,000.00	127,850.00
February.....	108,196.00	370.00		3,220.00	111,786.00
March.....	43,629.00	19,510.00	\$5,000.00		68,139.00
April.....	76,911.00	370.00		476.00	77,757.00
May.....	7,000.00				7,000.00
June.....	157,500.00				157,500.00
Total.....	985,956.50	27,600.00	5,000.00	26,196.00	1,044,752.50

TABLE No. 9.—*School section*.

MONTHLY ENROLLMENT AND AVERAGE DAILY ATTENDANCE.

Month.	White schools.			Colored schools.		
	Monthly enrollment.		Average daily attendance.	Monthly enrollment.		Average daily attendance.
	Gross.	Net.		Gross.	Net.	
1916.						
October.....	1,347	1,277	1,187.5	591	581	478.0
November.....	1,434	1,326	1,209.8	640	626	490.1
December.....	1,478	1,350	1,226.4	658	640	450.6
1917.						
January.....	1,645	1,407	1,232.0	769	711	515.3
February.....	1,741	1,440	1,262.9	820	740	494.7
March.....	1,979	1,464	1,296.8	888	787	521.5
April.....	2,054	1,487	1,265.4	967	833	524.7
May.....	2,116	1,512	1,210.5	990	853	502.7
June.....	2,133	1,518	1,175.1	993	855	512.5

TABLE No. 9.—*School section*—Continued.

REPORT OF ANNUAL PHYSICAL EXAMINATIONS OF CHILDREN OF WHITE GRADE SCHOOLS DURING OCTOBER, 1916.

Total number of pupils examined.....	1,038
Number of pupils found needing treatment.....	682
Number with other defects than those of teeth only.....	454
Number with teeth as only defect.....	228
Percentage of those examined needing treatment.....	65.7
Defects found:	
Defective vision.....	82
Defective hearing.....	13
Defective nasal breathing.....	41
Hypertrophied tonsils.....	243
Pulmonary disease.....	7
Cardiac disease.....	5
Chorea or other nervous disorder.....	5
Malnutrition.....	12
Orthopedic defects.....	5
Defective teeth.....	459
Contagious disease (impetigo contagiosa).....	1
Enlarged cervical glands.....	41
Contagious skin disease.....	3
Speech.....	1
Total number of cases treated.....	918
Number of pupils vaccinated.....	357
	169

STATEMENT SHOWING NUMBER OF PUPILS IN CANAL ZONE SCHOOLS IN MARCH, 1917, WHO ATTENDED SCHOOLS IN THE UNITED STATES AND OTHER COUNTRIES BEFORE ENTERING THE CANAL ZONE SCHOOLS, AND NUMBER OF PUPILS WHO NEVER ATTENDED OTHER THAN CANAL ZONE SCHOOLS.

	White schools.	Colored schools.	Total.		White schools.	Colored schools.	Total.
UNITED STATES.				UNITED STATES—con.			
Alabama.....	7		7	Wisconsin.....	3		3
Arizona.....	2		2	Wyoming.....	3		3
Arkansas.....	1		1	Total.....	720	1	721
California.....	25	1	26	OTHER COUNTRIES.			
Colorado.....	3		3	Philippines.....	2		2
Connecticut.....	12		12	Porto Rico.....	1		1
Delaware.....	6		6	England.....	6		6
District of Columbia.....	28		28	Ireland.....	2		2
Florida.....	14		14	Scotland.....	4		4
Georgia.....	11		11	Spain.....	3		3
Idaho.....	1		1	Germany.....	1		1
Illinois.....	33		33	Norway.....	2		2
Indiana.....	3		3	Cuba.....	1		1
Iowa.....	6		6	Panama Republic.....	35	26	61
Kansas.....	20		20	Mexico.....	2		2
Kentucky.....	2		2	Costa Rica.....	1	4	5
Louisiana.....	17		17	Nicaragua.....	1		1
Maine.....	12		12	Colombia.....	2		2
Maryland.....	15		15	Canada.....	2		2
Massachusetts.....	34		34	Egypt.....	1		1
Michigan.....	12		12	Venezuela.....	1		1
Minnesota.....	5		5	Guatemala.....	1		1
Mississippi.....	13		13	British West Indies:			
Missouri.....	9		9	Barbados.....	1	64	65
Montana.....	3		3	Antigua.....		2	2
Nebraska.....	7		7	Grenada.....		2	2
Nevada.....				Jamaica.....	2	72	74
New Hampshire.....	1		1	St. Lucia.....		6	6
New Jersey.....	65		65	Montserrat.....	1	1	1
New Mexico.....	1		1	St. Vincent.....		2	2
New York.....	142		142	Trinidad.....		6	6
North Carolina.....	7		7	Guadeloupe.....		2	2
North Dakota.....				British Guiana.....	2		2
Ohio.....	23		23	Country unknown.....	2		2
Oklahoma.....	3		3	Total.....	75	187	262
Oregon.....	1		1	United States.....	720	1	721
Pennsylvania.....	72		72	Other countries.....	75	187	262
Rhode Island.....	9		9	Pupils who never at-			
South Carolina.....	7		7	tended any but			
South Dakota.....	2		2	Canal Zone schools.	539	438	977
Tennessee.....	13		13	Total pupils			
Texas.....	29		29	listed.....	1,334	626	1,960
Utah.....	2		2				
Vermont.....	3		3				
Virginia.....	21		21				
Washington.....	7		7				
West Virginia.....	5		5				

TABLE No. 9.—*School section—Continued.*

EPITOME OF MORE IMPORTANT STATISTICS FOR THE YEARS ENDED JUNE 30, 1914, 1915, 1916, AND 1917.

	1914	1915	1916	1917
Number of school buildings.....	23	15	16	19
Buildings erected and converted.....	1	4	1	3
Additional rooms constructed (additions to existing buildings).....	4	2	4	1
Number of employees in division.....	75	65	60	70
Number of supervisory force.....	3	1	1	2
Total expenditures (approximate).....	\$89,000	¹ \$109,000	\$70,188.56	\$87,000
Estimated value of school property.....	\$130,000	\$120,000	\$110,000.00	² \$100,000
Not enrollment:				
White schools.....	1,270	1,146	1,366	1,518
Colored schools.....	1,492	1,430	783	855
White and colored.....	2,762	2,576	2,149	2,373
Per capita expense of maintenance, approximate (based on net enrollment).....	\$32.22	¹ \$42.31	\$32.66	\$36.66
Total days of attendance.....	277,016.5	283,988.5	258,244.0	295,697.00
White schools.....	100,017.5	157,537.0	183,206.0	209,782.00
Colored schools.....	116,999.0	126,451.5	75,038.0	85,915.00
Average daily attendance.....	1,682.9	1,762.2	1,501.4	1,709.2
White schools.....	967.7	1,006.3	1,065.1	1,212.6
Colored schools.....	715.2	755.9	436.3	496.6
Absence of teachers on account of sickness..... days..	213	217	161.5	234.5
Average monthly wages of teachers:				
White.....	\$98.37	\$98.78	\$98.84	\$109.52
Colored.....	\$56.96	\$59.75	\$60.56	\$65.00
Tuition collected.....	\$1,089.00	\$1,184.00	\$2,562.32	\$3,510.19

¹ Increase in expenditures due to erection of school buildings at Balboa, La Boca, and Gatun.

² Does not include value of new concrete school buildings under construction.

Holidays: Panama Independence Day, Nov. 3; Thanksgiving Day and the Friday following, Nov. 30 and Dec. 1; Christmas holidays, Dec. 23 to Jan. 7, inclusive; Washington's Birthday, Feb. 22; Easter Holidays, Mar. 31 to Apr. 8; Memorial Day, May 30.

TABLE No. 10.—*Number of summons, writs, citations, subpoenas, etc., served by the United States marshal for the Canal Zone from July 1, 1916, to June 30, 1917.*

Subpoena for probate of will.....	2
Summons for relief and complaint.....	53
Order of attachment.....	7
Summons to jurors.....	405
Subpoenas in civil cases.....	53
Citation on writ of error.....	1
Writ of injunction.....	3
Civil execution.....	2
Monition and attachment.....	7
Citation to defendant to show cause.....	2
Writ of habeas corpus.....	6
Subpoenas duces tecum.....	1
Motion to release property.....	1
Writ of mandamus.....	1
Bill in interpleader.....	1
Marshal's deed.....	1
Writ of scire facias.....	1
Number of receipts made for paymaster in payment of witnesses and jurors.....	119
Number of receipts made for payments revenue and trust funds.....	152
Number of days attendance on court at Cristobal.....	27
Number of days attendance on court at Balboa.....	101
The following summons, writs, citations, subpoenas, etc., were delivered in the marshal's office and service attempted, but parties could not be found and the service was not accomplished:	
Subpoenas for probate of will.....	1
Summons to jurors.....	59
Citations to defendants to show cause.....	1
Summons for relief and complaint.....	9
Subpoenas in civil cases.....	3
Order of replevin.....	1
Civil execution.....	6

TABLE No. 10.—*Number of summons, writs, citations, subpoenas, etc., served by the United States marshal for the Canal Zone from July 1, 1916, to June 30, 1917—Continued.*

FINANCIAL TRANSACTIONS IN OFFICE.

Month.	Witness fees.	Juror fees.	Revenue.		Trust fund.	
			Received.	Remitted to collector.	Received.	Paid out.
1916.						
July.....	\$100.00	\$23.00	\$11.35	\$11.35	\$510.70	\$1.70
August.....		18.00	23.92	23.92	357.10	357.10
September.....		5.00	34.64	34.64	509.25	1,018.25
October.....	46.00	13.00	10.70	10.70		
November.....		12.00	24.50	24.50	8.45	.25
December.....		41.00	4.75	4.75		8.20
1917.						
January.....	66.00	12.00				
February.....		9.00	8.40	8.40	26.05	26.05
March.....		5.00	64.54	64.54	4,954.12	4,954.12
April.....	26.00	7.00	24.82	24.82	189.43	155.00
May.....		6.00	26.75	26.75	96.55	101.66
June.....	15.00	2.00	39.70	39.70	79.00	108.32
	253.00	153.00	274.07	274.07	6,730.65	6,730.65

Witness and jurors fees cash on hand, as above, \$100.

Total earnings of office for fiscal year, \$274.07.

Keeping civil and criminal dockets, juror and witness fees book and cash book.

Making monthly accounts and general office correspondence, office files, etc.

APPENDIX H.

REPORT OF THE DISTRICT ATTORNEY FOR THE CANAL ZONE.

ANCON, CANAL ZONE, *August 1, 1917.*

SIR: There is attached a tabulated statement of all criminal prosecutions in the district court of the Canal Zone for the fiscal year ended June 30, 1917. There was a total of 353 cases disposed of in the district court, 89 of which were appeals from the magistrates' courts.

Of the total number disposed of, 245 resulted in convictions.

Eight defendants requested jury trials, and of these 3 were convicted and 5 acquitted.

There have been no appeals in criminal cases to the Circuit Court of Appeals of the Fifth Circuit at New Orleans.

At the end of the fiscal year no criminal cases were pending in the district court except such as had arisen since the last term of court in June. There was pending one case of disbarment against an attorney of the Canal Zone, in which the court had filed a formal notice of disqualification.

For the fiscal year 1915-16 a total of 427 cases was disposed of in the district court, and the number this year shows a considerable decrease. This decrease in the number of cases corresponds very closely to the ratio of decrease in population of the Canal Zone since the close of the last fiscal year.

There have been no suits against the Governor of The Panama Canal under the Panama Canal act for injuries to vessels while passing through the canal locks.

During the fiscal year four civil cases of importance have been finally disposed of. Two of these, *Dixon et al. v. Goethals et al.* and *Anderson et al. v. Goethals et al.*, were of a similar nature and were referred to in the last annual report. They were bills for injunction against the Governor of The Panama Canal and other officials, which sought to prevent the taking over of lands near Mount Hope for the purposes of the canal. The district court here decided in favor of the defendants, and this judgment has been affirmed both in the circuit court of appeals and in the Supreme Court of the United States.

This final decision of the Supreme Court of the United States will prevent any further attempt at resistance through the court to the taking over of all the lands within the Canal Zone.

Another case which was also referred to in the last annual report was a mandamus sought by a clerk on the silver roll to compel the

auditor of The Panama Canal to pay him his monthly wages. When the case was brought to a hearing it was dismissed upon the demurrer filed in behalf of the auditor.

The suit filed by Edmund M. Sinclair against the Y. M. C. A. for \$5,000 damages for removing him from one of the clubhouses was also dismissed upon demurrer.

One of the cases referred to in my last annual report, that of mandamus brought by Judge William H. Jackson, of the district court, against the auditor of The Panama Canal, is now pending in the Supreme Court of the United States. Judge Henry D. Clayton, of the Middle and Northern Districts of Alabama, who presided upon the trial here on account of the disqualification of Judge Jackson, rendered a decision in favor of the complainant. By direction of the Secretary of War the case was carried to the Circuit Court of Appeals by writ of error and the decision of Judge Clayton was affirmed. On account of the importance of the legal questions involved the Secretary of War directed that an appeal be taken to the Supreme Court of the United States, where it is now pending.

The failure of a bank in the city of Panama some months ago has caused considerable losses to depositors residing in the Canal Zone. An examination of the affairs of the bank showed a remarkable mismanagement of its affairs, probably without precedent. The bank operated for about three years and at the time of its failure owed depositors \$245,000, and only some \$400 in cash was found in the bank. More than \$100,000 of its capital stock had been subscribed for and only about \$14,000 had been paid in upon the subscriptions to capital stock.

The bank operated entirely upon the money of the depositors, and this money was invested in doubtful enterprises and wasted upon impracticable schemes. The bank was continually insolvent almost from its inception.

A few days prior to the failure of the bank nearly all of its assets were transferred to one creditor in settlement of an alleged prior debt.

Our Criminal Code provides in section 400, page 146:

Every officer, agent, teller, or clerk of any bank, and every individual banker, or agent, teller, or clerk of any individual banker, who receives any deposits, knowing that such bank, or association, or banker is insolvent, is guilty of a felony.

Section 408, page 147:

It is no defense to a prosecution for a violation of the provisions of this chapter that the corporation was one created by the laws of any other or foreign State, Government, or country, if it was one carrying on business or keeping an office therefor within the Canal Zone.

The local manager of the bank E. F. Bataille, came into the Canal Zone in August, 1916, and accepted deposits for the bank from soldiers at Corozal, Las Cascadas, and Fort Grant. The banking house was located in Panama, but there was no prosecution of Bataille there, and he left here and went to the United States and located in New Jersey. The facts were not made known to the officers of the law in the Canal Zone until after Bataille had gone. Affidavits were prepared charging Bataille with the commission of a felony under section 400, and his extradition from New Jersey was sought.

The governor of New Jersey declined to honor the extradition request on the ground that the "evidence of criminality was insufficient." I am of the opinion that the affidavits clearly showed the commission of a felony within the Canal Zone and that the request for extradition should have been granted.

In this connection it might be of some advantage hereafter to amend section 408, page 147, of the Laws of the Canal Zone. The Supreme Court of the United States has held that one isolated act of doing business is not carrying on business, and since this decision was rendered some States in the United States have provided by law that one act of doing business is sufficient to render an individual or corporation amenable to the laws against carrying on business, etc., and I recommend that section 408 be amended so as to read:

Any one act of doing business by an individual or corporation constitutes a violation of the provisions of this chapter.

Respectfully,

CHARLES R. WILLIAMS,
District Attorney.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

TABLE No. 1.—*Criminal prosecutions, 1916-17.*

	Number.	Guilty.	Not guilty.	Disposed of otherwise.	Remarks.
Adultery.....	3	1		2 dismissed.....	
Aiding and abetting in the commission of a felony.....	1			1 nol-pros.....	
Assault and battery.....	8	6	1	1 bail forfeited.....	4 guilty assault and battery.
Assault with deadly weapon.....	10	7	3		
Assault with intent to commit rape.....	1		1		
Attempt to defraud.....	2	2			
Automobile regulations, violation of.....	18	11	5	1 dismissed; 1 bail forfeited.....	
Battery.....	10	6	3	1 nol-pros.....	1 assault; 1 assault and battery.
Bicycle ordinance, violation of.....	1		1		
Bringing stolen property into Canal Zone.....	8	6	1	1 dismissed.....	
Burglary, attempt to commit.....	1	1			
Burglary.....	24	21	2	1 nol-pros.....	
Buying Government property from a soldier.....	2	1		do.....	
Coach tariff regulations, violation of.....	1	1			
Cruelty to animals.....	1	1			
Customs regulations, violation of.....	12	10	1	1 bail forfeited.....	
Defensive-area act, violation of.....	32	32			
Defrauding by false representation.....	2		2		
Deportation, returning to Canal Zone.....	5	2	3		
Disorderly conduct.....	16	9	7		
Drunk.....	1	1			
Embezzlement.....	9	1	2	1 mistrial; 5 nol-pros.....	
Escaping from prison.....	1	1			
Forgery.....	12	8		4 nol-pros.....	1 false personation.
Fraud.....	2		1	1 dismissed.....	
Fraudulent sale of property.....	1		1		
Fugitive from justice.....	1	1			
Gambling.....	2	1			
Grand larceny.....	52	37	12	3 dismissed.....	17 petit larceny.
Immigration regulations, violation of.....	2	2			
Infamous crime against nature.....	1		1		
Involuntary manslaughter.....	2	1	1		
Jumping from moving train.....	1		1		
Liquor regulations, violation.....	2	2			
Loitering.....	11	8	3		
Lottery laws, violation.....	4	4			
Malicious mischief.....	1		1		

TABLE No. 1.—*Criminal prosecutions, 1916-17*—Continued.

	Num- ber.	Guilty.	Not guilty.	Disposed of other- wise.	Remarks.
Malicious mischief to railroad.....	1	1	.....	.....	1 disorderly con- duct.
Manslaughter.....	1	.....	1	.....	.....
Murder.....	2	2	.....	.....	1 manslaughter; 1 second degree.
Navigation rules, violation of.....	24	24	.....	.....	.....
Nonsupport.....	1	.....	1	.....	.....
Obtaining money or property by false pretenses, etc.	5	4	.....	1 mistrial.	.....
Opium act, violation of.....	2	2	.....	.....	.....
Perjury.....	2	.....	2	.....	.....
Petit larceny.....	9	5	4	.....	.....
Postal laws, violation of.....	10	4	6	.....	.....
Public nuisance.....	1	1	.....	.....	.....
Quarantine regulations, violation of.....	1	1	.....	.....	.....
Rape.....	2	2	.....	.....	1 lewd and lasciv- ious cohabita- tion; 1 assault with intent to commit rape.
Receiving stolen property.....	7	.....	7	.....	.....
Resisting an officer.....	4	3	.....	1 nol-pros.....	.....
Rescuing a prisoner.....	1	.....	1	.....	.....
Robbery.....	2	1	1	.....	.....
Sanitary regulations, violation of.....	4	4	.....	.....	.....
Seduction.....	1	1	.....	.....	1 lewd and lasciv- ious cohabita- tion.
Trespass.....	6	2	1	3 bail forfeited.....	.....
Unlawful wearing United States uni- form.	1	.....	.....	1 dismissed.....	.....
Vagrancy.....	3	3	.....	.....	.....
Total.....	353	245	77	31	.....

One application for writ of habeas corpus—withdrawn.

APPENDIX I.

REPORT OF SPECIAL ATTORNEY.

ANCON, CANAL ZONE, *August 13, 1917.*

SIR: I have the honor to submit herewith a report on the affairs of this office for the fiscal year ended June 30, 1917:

As heretofore, I shall include in this report all matters relating to the legal affairs and land matters of the Panama Railroad Company on the Isthmus. The practice of combining the report on Panama Railroad business transacted by this office with the report of the activities of the special attorney's office has been followed in order to avoid the duplication of reports.

The organization of the special attorney's office at present consists of the special attorney, with an assistant, two land inspectors, and two clerks on the gold roll and one clerk and a messenger on the silver roll.

The special attorney is charged with the duty of revising and codifying the laws of the Canal Zone. This work has not been carried to completion, due to the fact that this office has been engaged in the settlement and adjustment of land claims and in defending the interests of the United States before the Joint Commission. In addition the ruling of the Attorney General to the effect that the President of the United States was without power to revise the presidential orders issued prior to the passage of the Panama Canal act has prevented this office from submitting any modifications of existing laws and orders for the approval of and promulgation by the President.

In view of the opinion of the Attorney General, legislation was requested from Congress for the modification of some of the pre-existing laws that were not in harmony with the changed conditions in the Canal Zone.

On August 21, 1916, Congress enacted an act entitled "An act extending certain privileges of canal employees to other officials on the Canal Zone and authorizing the President to make rules and regulations affecting health, sanitation, quarantine, taxation, public roads, self-propelled vehicles, and police powers on the Canal Zone, and for other purposes, including provision as to certain fees, money orders, and interest deposits." The bill as originally presented contained a provision granting certain privileges to officials and employees of the United States on the Isthmus similar to the privileges now granted to canal employees, but the provision was eliminated before final passage, though the clause in the title of the act which

refers to the above-mentioned privileges was for some unknown reason retained. The act has the following purposes:

1. It authorizes the President to make rules and regulations in matters of health, sanitation, and quarantine for the Canal Zone, and to modify or change existing rules or regulations, as well as those hereafter made from time to time.

2. It empowers the President to make and enforce rules and regulations for the use of public roads and highways in the Canal Zone, and for regulating, licensing, and taxing the use and operation of all self-propelled vehicles using the public highways.

3. It makes it unlawful for any person to commit any breach of the peace or engage in or permit any disorderly, indecent, or immoral conduct in the Canal Zone. This provision of the act was inserted by the committee of Congress in substitution of a provision contained in the bill drafted on the Isthmus, which vested power in the President to enact police rules and regulations for the Canal Zone. The preexisting laws of the Canal Zone were sufficient to cover any ordinary breach of the peace or any disorderly, indecent, or immoral conduct. Hence the provision in the bill did not add to or take from the preexisting law.

4. It provides that deposit money orders issued by the Canal Zone post offices shall bear interest at a rate not to exceed 2 per cent per annum.

5. The act authorizes customs officers of the Canal Zone to collect fees equivalent to those prescribed by the United States consular regulations for services performed by consular officers for all certificates, marine protests, or any notarial services.

6. The law bestows on the shipping commissioner and deputy shipping commissioner of The Panama Canal the same powers in respect to seamen of vessels of the United States as those exercised by consular officers of the United States in foreign ports and by shipping commissioners in ports of the United States.

7. Lastly, the act authorizes the President to make rules and regulations touching the right of any person to enter or remain upon or pass over any part of the Canal Zone; and the President is thereby authorized to establish rules and regulations requiring any vessel bringing a person to the Canal Zone in contravention of law to return such person to the country from whence he came; and to secure the proper enforcement of these rules and regulations the law provides that the owner of a vessel, in addition to the fine and penalties authorized by the law, may be required to pay all costs of the detention and return of the person whose entry is prohibited, and clearance may be withheld from such vessel from any port of the Canal Zone until the fine imposed and all costs of maintenance of the person are paid.

The law also prescribes the various penalties that may be imposed for violations of its provisions.

Acting under the authority of the above-mentioned act of Congress an Executive order was promulgated by the President on September 5, 1916, entitled "Executive order relating to motor vehicles and their operation in the roads of the Canal Zone." This order was prepared on the Isthmus under the supervision of this office. It prescribes the license fees to be charged for the various kinds of

motor vehicles and permits the Governor to exempt from the payment of license fees motor vehicles operated exclusively within certain areas or districts of the Canal Zone to be defined by him, and to prohibit by public notice motor vehicles from operating on such portions of the Canal Zone as he may designate when, in his judgment, the public interest requires it; or he may authorize any of said vehicles to be operated in any areas or districts designated by him upon such conditions as he may deem necessary and convenient for the welfare of The Panama Canal. The Executive order also contains provisions of a police nature respecting the operation of vehicles on the roads of the Canal Zone and within the limits of any city, town, or village.

Pursuant to the same act of Congress, the President promulgated an Executive order dated February 6, 1917, relating to the exclusion of Chinese. The purpose of the Executive order was to repeal the Executive order of January 9, 1908, extending to the Canal Zone law No. 6 of 1904 of the Republic of Panama. The laws of the Canal Zone relating to the exclusion of Chinese and Asiatics were in some confusion, owing to the fact that law No. 6 of 1904 of the Republic of Panama, which was made applicable to the Canal Zone by the Executive order of January 9, 1908, had been materially modified by the Assembly of Panama, and in consequence the legislation of the Canal Zone regarding the exclusion of Chinese was not in harmony with that of the Republic of Panama. Law No. 6 of 1904 of Panama was extended to the Canal Zone simply for the purpose of cooperating with the Republic in the enforcement of its exclusion law. The extension of the law to the Canal Zone was not necessary to protect the interests of the United States, inasmuch as the pre-existing exclusion and deportation laws of the Canal Zone were amply sufficient for that purpose.

Law No. 6 of 1904 of the Republic of Panama is no longer in force in the Canal Zone since the enactment of the above Executive order. It is believed that the Executive order confers ample authority upon the Governor of The Panama Canal to cooperate with the Republic of Panama in preventing the entry into that jurisdiction of Chinese in violation of Panaman laws. The Executive order gives much more liberty to vessels carrying Chinese crews and transiting the canal than was the case prior to the repeal of the Executive order of January 9, 1908, the purpose being to make the canal as free for the transit of ships as is consistent with the safety of the canal and the preservation of good order in the Canal Zone.

Another Executive order was issued by the President on February 6, 1917, by authority of the above-mentioned act of Congress, for the exclusion and deportation from the Canal Zone of undesirables. The Executive order takes the place of the exclusion law of the Canal Zone contained in President Roosevelt's letter to the Secretary of War, dated May 9, 1904, and is more comprehensive in its scope and provisions, and provides a more efficient machinery for the exclusion and deportation of the various classes of persons whose entrance or permanency in the Canal Zone is considered detrimental to public health and good order.

A number of additional laws affecting the canal were passed by Congress, but the legislation was not enacted at the instance of the canal authorities, though modifications in the laws before their

passage were made at the suggestion of the authorities here, and for that reason will not be referred to in detail in this report; and so I might say in respect to some Executive orders promulgated by the President, other than those above mentioned, which were not handled by this office.

Mr. Robert S. Carlson, land agent, resigned on May 20, 1917, for the purpose of going to France to do service in the ambulance corps of the American Red Cross, and since that date Mr. W. F. Van Dame, my assistant, has been acting as land agent.

There were 199 claims settled and paid during the past fiscal year by the land office. These claims aggregate in amount \$140,456.66, making the total of 4,381 claims settled and paid since the work of clearing the Canal Zone was commenced under the President's depopulation order of December 5, 1912, aggregating the sum of \$992,023.30. These settlements were made independently of the Joint Commission, and no awards made by that tribunal were included in such settlements.

The law department was authorized to adjust and settle land claims by the Executive order of August 6, 1908. Since that date the law department and the office of the special attorney have settled and paid 5,443 claims of damages for lands and improvements, claimed by private parties and taken over by the Government for canal purposes, aggregating \$1,240,926.60.

The Joint Commission made 43 awards, covering 85 claims during the past fiscal year. These awards aggregate the sum of \$171,538.30. Fifteen of the awards were for land claims and 70 for improvements only.

The total number of awards made by the Joint Commission since the promulgation of the President's depopulation order of December 5, 1912, to June 30, 1917, was 164, involving 850 claims, and aggregating \$847,502.64. The awards of Joint Commissions appointed under Articles VI and XV of the Panama Canal treaty, prior to the President's depopulation order of December 5, 1912, amounted to 21, involving 21 claims, aggregating \$304,588, which gives a grand total of 865 claims settled and paid for under awards made by all commissions appointed under the treaty, aggregating \$1,152,090.64.

Therefore the aggregate amount paid out by the United States for lands and improvements through the law department and special attorney's office and by virtue of Joint Commission awards was \$2,393,017.24.

During the last fiscal year the Joint Commission dismissed 14 claims for lack of evidence and 388 claims because direct settlement had been made with the claimants by the representatives of the United States. There were 305 claims dismissed under rules of default against the claimants, who had failed to appear to prosecute their claims after due notice by publication had been given in one of the local newspapers in the city of Panama for 60 days. Eight claims were dismissed for want of jurisdiction in the Joint Commission to entertain them; 1 claim was dismissed for reason that it was filed after March 27, 1915, the period fixed by rule of the commission, with the consent of both Governments, within which claims were required to be filed. One claim was dismissed because it was found to be a duplicate of a claim filed under another name by another person, which fact was admitted by the person whose claim

was dismissed; and 10 claims were dismissed because they had already been disposed of by awards of a previous commission, the total number of claims dismissed being 727. Two claims that had been previously dismissed were reinstated by the commission.

During the fiscal year 20 claims were certified to the umpire by the Joint Commission, 8 of which were recertifications of claims previously certified, and the recertifications were on grounds different from those stated in the first certificate. Of the claims referred to the umpire by the commission, 4 were withdrawn from his consideration and awards made to the claimants by the Joint Commission.

The umpire dismissed 2 of the cases certified to him by the commission, 1 of which had been certified to him during the last fiscal year and the other being a recertification to him during the present fiscal year. He disposed of 7 claims, involving 7 docket numbers, the aggregate sum awarded by him being \$175,000.

Admiral Victor Maria Concas y Palau, who was appointed umpire of the Joint Commission under provisions of Articles VI and XV of the Panama Canal treaty, died on September 25, 1916, while on a visit in Spain after he had rendered the awards above mentioned.

Mr. Manuel Walls y Merino was selected by His Majesty, the King of Spain, as umpire under the Panama Canal treaty to succeed Admiral Concas y Palau, on March 24, 1917, at the request of the President of the United States and the President of Panama. Owing to the delay caused by the preparation of the records for submission to the umpire, the latter did not make any awards during the last fiscal year.

The number of claims remaining for the umpire's consideration is nine, including a claim referred to the umpire during the preceding fiscal year. All but two of the nine claims pending before the umpire are of the class known as "land claims." The two are claims for improvements only.

There were pending before the commission on June 30, 1917, 97 land claims, the aggregate amount claimed being \$8,600,602.90; 61 claims for improvements constructed on lands held under lease from the Panama Railroad Company, involving \$274,428.40; and 21 claims for improvements either on the call docket and heard but not decided or pending a final ruling of default, involving \$54,247.55.

A total of 3,595 claims were filed with the Joint Commission. Of this number 3,449 have been disposed of as follows:

During the fiscal year 1913-14 the commission dismissed 602 claims, made 629 awards, and certified 22 disagreements, making a total of-----	1, 253
During the fiscal year 1914-15 the commission dismissed 377 claims, made 85 awards, and certified no disagreements, making an aggregate of-----	462
During the fiscal year 1915-16 the commission dismissed 572 claims, made 27 awards, and certified 15 disagreements, making a total of-----	914
During the fiscal year 1916-17 the commission dismissed 727 claims, made 85 awards, and certified 8 disagreements to the umpire, making a total of--	820
Grand total -----	3, 449

According to these figures, 146 claims would now be pending before the commission. As a matter of fact, there are 179 cases pending before that tribunal, or 33 cases more than the foregoing statement would indicate.

The discrepancy of 33 cases can be explained by the fact that in many instances, especially in the early Gorgona trials, a part of the claim would be awarded for and another part would be certified to

the umpire; in other instances, such as in the Grout claim, docket No. 13, an award was made for the improvements, leaving the land claimed by the same docket number to be disposed of later; and some of these cases yet remain upon the commission's docket, and in still other instances a part of a claim has been dismissed and a part awarded for. This will explain the seeming discrepancy.

On August 7, 1916, Admiral Concas, who was then the umpire appointed under the provisions of Article XV of the Canal treaty, rendered an award in favor of the estate of John McGregor, deceased, Edgerton Shaw Humber, administrator, for the sum of \$30,000. I declined to certify the award for payment and recommended to the Washington authorities that it be protested.

The Joint Commission failed to agree upon the award. Messrs. Kagy and Cornet, the two American members of the commission, certified this disagreement to our Government at Washington, and their certificate indicated that the commission's disagreement was general. Subsequently, a change took place in the personnel of the commission, and of the members who sat on the trial of the claim only Judge Cornet remained. A certificate of disagreement was then submitted to the umpire of the Joint Commission, as reorganized, upon the issue of value only. It is the contention of counsel for the Government that after certifying the general disagreement to our Government, the commission was without jurisdiction to submit the case to the umpire upon a special issue. The umpire accepted the findings of the commission in favor of McGregor as to title, upon the theory that he was concluded by the ruling of that tribunal, and hence limited himself to the question of value only.

The 600 hectares claimed by McGregor included some 67½ hectares of land which the United States had purchased previously from Col. B. Burns Duncan, and which had been occupied by him for many years. It is the contention of counsel for the Government that the commission was without jurisdiction to pass upon the validity of the deed from Col. Duncan to the United States, because the power of the commission is limited to claims wherein the United States has taken property under the terms of the treaty, and not in cases in which possession of the property was obtained by the United States under and by virtue of a municipal contract with a person in actual occupancy of the property, and this is especially so in reference to the Duncan case, because he was in possession of the property long prior to the date on which the Panama Canal treaty was made.

Counsel for the Government also contend that the award is excessive, and for all of these reasons I declined to certify the award for payment, and have submitted the matter to the Washington authorities for their resolve. No final action has been taken by the State Department in the case.

On September 8, 1916, Edgerton Shaw Humber, administrator of the estate of John McGregor, applied to the district court of the Canal Zone for a writ of mandamus against the auditor of The Panama Canal, compelling him to allow the claim as awarded to the estate of John McGregor. The trial of the case has been deferred, at the request of the State Department, in order that the latter may have an opportunity to investigate the case and determine whether the award should be protested to the Panaman Government.

On December 28, 1916, a motion was filed by counsel for the Government with the Joint Commission, asking that in the trial of claims no evidence be admitted by the commission respecting values, except such evidence as tended to prove the values of property prior to November 19, 1903, in conformity with Article VI of the Panama Canal treaty.

On May 16, 1917, the Joint Commission overruled the motion of Government's counsel by a majority vote, Judge Bouvé dissenting. I have not acquiesced in that ruling, and the matter has been submitted, through proper channels, to the State Department, together with the opinions of the Panaman members of the commission and the respective opinions of Commissioners Bouvé and Cornet.

The purpose of Government's counsel in presenting the motion was to obtain a ruling that would eliminate evidence of a speculative and fictitious character in respect to values. Again, the liberality shown by the commission in the admission of evidence in respect to values has tended to greatly prolong the trial of claims. It was with a view of expediting the proceedings before the commission that the motion was made, as well as to have the evidence confined to the relevant issues in the cases, in order that justice might be done to all parties. I am of the opinion that if the rule were adopted, the time necessary for the disposition of cases now pending on the commission docket would be reduced at least two-thirds.

On June 30, 1917, there were 45 leases in effect, issued by the land office, for The Panama Canal for lands within the Canal Zone, of which number 15 were issued during the fiscal year just ended. These licenses include lots occupied by various oil companies for oil-tank sites, residences for the employees of the various oil companies, church buildings, lodge halls, and other purposes. The total rental collected under the licenses above mentioned was \$15,008.02. No rental is collected from the religious organizations for lots occupied by them under license.

PANAMA RAILROAD COMPANY MATTERS.

I am submitting a statement of leases and licenses from the Panama Railroad Company to various parties, in effect July 1, 1917, as shown by the land office records:

Location.	Leases.		Lots.		Rental.	
	July 1, 1916.	July 1, 1917.	July 1, 1916.	July 1, 1917.	July 1, 1916.	July 1, 1917.
Colon.....	794	817	819	830 ¹	\$82,885.80	\$83,907.24
Fox River, Republic of Panama.....	53	54	55	54	2,364.40	2,580.00
Fox River, Canal Zone.....	17		16		1,264.20	(¹)
Stable lots, Colon.....	9	9	12	12	576.00	576.00
Las Esplanadas.....	105	105	124	212 ¹	4,010.60	\$3,986.00
Guachapali.....	153	153	195	194	8,154.16	8,154.00
Santa Cruz.....	88	88	100 ¹	100 ¹	3,977.08	3,977.28
Panama yard.....	17	18	20 ¹	30 ¹	4,350.00	5,130.00
Juan Ponce.....	1		1		60.00	60.00
Total.....	1,237	1,241	1,358	1,348 ¹	107,642.24	108,370.52

¹ Canceled effective Apr. 7, 1914; 4 revocable licenses issued for 4¹/₂ lots, annual rental \$65 now collected by Panama Canal.

² Due to replotting of lots; not an actual decrease in area leased.

³ Not a decrease over last year; last year's figures should have read the same as this year's.

Location.	Licenses and per- missions.		Lots.		Rental.	
	July 1, 1916.	July 1, 1917.	July 1, 1916.	July 1, 1917.	July 1, 1916.	July 1, 1917.
Miscellaneous (Colon).....	8	6	.....	.....	\$145. 00	\$165. 00
Miscellaneous (Panama).....	.....	1	.....	1	.....	1. 00
Buildings, rooms, and stores, Colon...	15	15	.....	.....	15, 949. 64	18, 367. 68
News agency.....	1	1	.....	.....	1, 560. 00	1, 560. 00
Cristobal.....	3	6	3	6	1, 200. 00	1, 801. 00
Mount Hope.....	5	.....	13	.....	(1)	.....
Huerta-Sandoval.....	4	2	6	2	666. 00	360. 00
Balboa buildings.....	6	.....	.....	.....	2, 253. 00	(2)
Total.....	42	31	22	9	21, 773. 64	22, 254. 68
Grand total for all leases, licenses, and permissions.....	1, 279	1, 275	1, 380	1, 357½	129, 415. 88	130, 625. 20

¹ Collected by The Panama Canal since Jan. 1, 1916.

² Collected by The Panama Canal since July 16, 1916.

The foregoing statement shows a slight increase in the amount of approximated rentals of the lots leased in the city of Colon as compared with those rentals for the year ended June 30, 1916. This is due to the fact that the railroad company has leased a few additional lots in Colon during the past fiscal year, particularly in that area known as the manufacturing district. But there is little probability of the rentals collected on account of Colon leases being further increased during the present fiscal year, as the railroad company has now leased all of its available building lots in Colon.

The rentals set out in the foregoing statement are taken from the book records of this office as of June 30, 1917. The total amount of money actually collected, however, from all Panama Railroad properties occupied under lease, license, and permission during the past fiscal year, which figures have been submitted to this office by the Panama Railroad accountant, is \$131,253.81, which is a decrease of \$1,213.73 from the actual collections for the fiscal year ended June 30, 1916.

The records of the land office show that 51 new leases were executed by the Panama Railroad Company during the fiscal year, covering 57½ lots, in the cities of Colon and Panama. Some of these leases were renewals and others were for lots previously leased to parties who failed to comply with the terms of their lease, as a consequence of which cancellation of such leases was effected, and the lots were readvertised and leased to other parties.

Although the President's depopulation order of December 5, 1912, applied to all privately owned lands in the Canal Zone, the canal authorities did not actually appropriate lands except as they were needed, and in consequence leases of land executed between private parties, including the Panama Railroad Company, were allowed to continue until the latter part of the year 1914, and in some instances the occupants of the land were not disturbed until later. The Panama Railroad Company had leased some lots at Folks River in the Canal Zone, and these leases were not disturbed even after the lands had been constructively taken over by The Panama Canal, until April 7, 1917, when all the Panama Railroad leases at Folks River were canceled. The occupants of the lots, with one exception,

have all been compensated for the houses and improvements constructed by them upon the leased lots.

During the past fiscal year the town site of New Cristobal, on the island of Manzanillo, at which employees of The Panama Canal and the Panama Railroad Company will be quartered, has been filled in. This site is on the northeastern side of Manzanillo Island, and is designated on the Panama Railroad Company's map of 1909 as blocks 14, 15, 22, 23, 24, and 25. All of the necessary municipal improvements were installed in this section, and at the end of the fiscal year there were about 42 houses of the cottage and four-family types almost ready for occupancy.

In that part of New Cristobal which had already been put in municipal order, and on which houses had been erected, the United Fruit Co. applied for and received a license for a plot of land on which to build dwelling houses for the company's employees.

On the morning of July 9, 1916, a fire broke out in Colon involving two blocks lying between Front and Bolivar Streets, and bounded on the north by Fifth Street, and on the south of Sixth Street. A total of 19 buildings were destroyed on 14 lots (lots Nos. 133, 134, 135 north, 135 south, 136, 137, 138, 139, 247, 249, 251, 253, 255, and 257) leased from the Panama Railroad Company, and the total value of these buildings according to the records of the Panaman Government tax office was \$95,500. To the total loss on the above lots there must be added the sum of \$3,500, the estimated damage to the municipal palace and the buildings on lot 541, which will make the grand total of loss and damage to buildings about \$99,000. New 25-year leases have been issued from July 1, 1916, to all the lessees of the aforementioned lots in said burned area. The new form of contract provides for the termination of same on one year's notice from the Panama Railroad, the lessee to be compensated for the value of the improvements placed upon the lot, but not for any intangible value which may exist by reason of the location, nature of business, or other cause, nor for any value of the unexpired portion of the lease period. The Panama Railroad Company owned no buildings within the area swept by the fire of July 9, 1916.

On the morning of February 21, 1917, another fire occurred in Colon, destroying 13 houses which were situated on 9 lots belonging to the railroad company. The area burned comprised the south half of the two blocks bounded on the north by Sixth Street, on the east by Bolivar Street, on the south by Seventh Street, and on the west by Front Street. The lots affected are numbered 272, 274, 276, 278, 551, 553, 555, 557, 559, and the total value of the buildings destroyed upon these lots was \$67,000, United States currency, which values were taken from the Colon tax list for 1916. The stores on the Front Street lots, namely, Nos. 272, 274, 276, and 278, had been vacant for some time, and, consequently, there were no goods in these stores. Possibly the total loss of furniture and merchandise in the balance of these buildings amounted to \$15,000, which would make the total probable loss \$82,000. There were no Panama Railroad buildings involved in this fire. New 25-year leases on the new form of contract have already been issued from March 1, 1917, to the lessees of lots 272, 274, 278, 551, 553, 555, and 559 in the burned area already referred to. No doubt the lessees of lots 276 and 557 will also request new leases within a short time.

In the early hours of January 26, 1917, a fire occurred in the Guachapali district of Panama City, destroying four houses which were located on five lots (lots Nos. 32, 33, 34, 35, and 36, block 3) belonging to the Panama Railroad Co. and leased to private individuals. The total value of the buildings destroyed on the above referred to lots was about \$15,500, United States currency, according to the figures in the public property register of the Panaman Government. No Panama Railroad buildings were involved in this fire.

The following Panama Railroad cases were settled, either by judgment or compromise, during the fiscal year 1916-17:

DISTRICT COURT, DIVISION OF CRISTOBAL.

Michael Chisholm v. Panama Railroad Company, civil No. 134: This was a suit brought for damages in the sum of \$5,000 on account of personal injuries; the complaint was filed on May 3, 1916, to which complaint the defendant company filed a demurrer on July 15, 1916, which demurrer was sustained by the court on August 17, 1916; the defendant thereupon carried the case to the United States Circuit Court of Appeals for the Fifth Circuit, New Orleans, La., by writ of error, which writ was dismissed by that court on February 5, 1917.

George Duncan Gittens v. Panama Railroad Company, civil No. 130: This was a suit brought for damages in the sum of \$10,000, on account of personal injuries. The complaint was filed on March 15, 1916, to which complaint the railroad company filed a demurrer on July 15, 1916, which demurrer was sustained by the court on August 17, 1916; whereupon plaintiff carried the case to the United States Circuit Court of Appeals for the Fifth Circuit at New Orleans, La., by writ of error, which writ was dismissed by the said court on February 5, 1917.

Dudley Smith v. Panama Railroad Company, civil No. 132: This was a suit for damages in the sum of \$2,500 on account of personal injuries; complaint was filed on April 17, 1916, to which complaint the defendant company demurred on July 15, 1916, which demurrer was sustained by the court on August 17, 1916; whereupon plaintiff carried the case to the United States Circuit Court of Appeals for the Fifth Circuit at New Orleans, La., by writ of error, which writ was dismissed by the said court on February 5, 1917.

Leopold B. Garcia v. Panama Railroad Company, civil No. 141: This was a suit brought for damages in the sum of \$3,500 on account of personal injuries; the complaint was filed on June 6, 1916; the case was set for trial on December 20, 1916, at which time the plaintiff exhausted the jury panel by peremptory challenges and challenges for cause. On January 13, 1917, plaintiff accepted the sum of \$500 in full settlement of his claim against the railroad company.

Daniel Pivott, administrator of the estate of Edwin C. Pivott, deceased, v. Panama Railroad Company, civil No. 142: This was a suit for damages in the amount of \$20,000 brought on account of injuries resulting in the death of Edwin C. Pivott. Complaint was filed on June 30, 1916; demurrer to the complaint was filed on July 22, 1916, which demurrer was overruled. Defendant's answer was filed on September 11, 1916; trial was had on November 15, 1916, by jury, at which time a verdict was returned in favor of the defendant company at the direction of the trial judge.

MAGISTRATE'S COURT, CRISTOBAL DIVISION.

Beatriz Martin v. Panama Railroad Company, civil No. 344: This was a suit brought for damages in the sum of \$300 on account of false arrest and malicious prosecution; the case was tried on March 24, 1917, at which time judgment was rendered in favor of the defendant company.

DISTRICT COURT OF THE CANAL ZONE, BALBOA DIVISION.

Joseph Marshall v. Panama Railroad Company, civil No. 235: This was a suit brought for damages in the sum of \$300 on account of injuries suffered by a horse by means of being run into by a Panama Railroad motor bus; the action was originally brought in the magistrate's court on May 27, 1916; trial was had on June 2, 1916, at which time judgment was rendered against the railroad

company in the sum of \$95, from which judgment the railroad company appealed to the district court, where the case was heard on July 1, 1916, and resulted in judgment against the railroad company in the sum of \$50 and costs, which judgment was satisfied on July 20, 1916.

Percy Peat v. Panama Railroad Company, civil No. 143: This was a suit brought for \$1,500 damages on account of personal injuries; the action was filed on December 9, 1916; the case was tried by jury on March 19, 1917, at which time a verdict was returned for the plaintiff and damages assessed at \$250; the judgment was satisfied on April 5, 1917.

The following Panama Railroad cases were pending at the end of the fiscal year 1917:

DISTRICT COURT OF THE CANAL ZONE, DIVISION OF CRISTOBAL.

James Daley v. Panama Railroad Company, civil No. 70: This is a suit brought for \$440 on account of debt; case was filed on May 27, 1916, since which time the case has been set for trial on several occasions, but, due to the absence of witnesses, illness of plaintiff's attorney, and other causes, up to this time has not been tried.

T. A. Green v. Panama Railroad Company, civil No. 97: This suit is brought for damages in the sum of \$1,000 on account of injuries to a horse resulting in its death; the case was filed on July 3, 1915; the defendant company demurred to the complaint, which demurrer was overruled on October 6, 1915. Answer was filed on October 12, 1915. Thereafter plaintiff filed an amended complaint on December 2, 1916, to which amended complaint the defendant company filed a demurrer on December 6, 1915, and which demurrer was overruled; the answer was filed on March 29, 1916, and was set for trial by jury on June 1, 1916, but on account of the illness of the plaintiff was indefinitely continued.

Alexander (or J.) McKey v. Panama Railroad Company, civil No. 172: This was a suit brought for damages in the sum of \$15,000 on account of personal injuries. This suit was filed on May 3, 1917; no pleadings have as yet been filed by the defendant company, for the reason that plaintiff's claim is now in process of amicable settlement.

Joseph T. Toppin v. Panama Railroad Company, civil No. 96: This is a suit brought for damages in the sum of \$15,000 on account of personal injuries. Proceedings were instituted on July 3, 1915. The defendant company demurred to the complaint, which demurrer was overruled on October 6, 1915. The defendant's answer was filed on October 12, 1915. Plaintiff's amended complaint was filed on December 2, 1916. Demurrer to amended complaint was filed on December 5, 1916, which demurrer was overruled on March 21, 1917. Defendant company's answer was filed on March 29, 1917. The case was tried by a jury on June 1, 1917, at which time a verdict was returned for the plaintiff, and damages were assessed at \$10,000. Motion for a new trial was filed on June 20, 1917. The motion was overruled on July 6, 1917, and the case will be taken to the Circuit Court of Appeals at New Orleans on behalf of the railroad company, and we hope to obtain a reversal of the judgment from the appellate court.

Joseph Payne v. Panama Railroad Company, civil No. 167: This is an action filed for damages in the sum of \$2,000 on account of personal injuries. The action was brought on April 12, 1917; defendant company's demurrer was filed on April 30, 1917.

Thomas and Noel Pigott v. Panama Railroad Company, civil No. 174: Suit was brought for damages in the sum of \$25,000 on account of personal injuries sustained by Noel Pigott, a minor. The action was filed on May 18, 1917. The demurrer to the complaint was filed on June 28, 1917.

Arnold Valencia v. Panama Railroad Company, civil No. 168: This is an action for damages in the sum of \$2,000, arising out of an alleged breach of contract which was filed on April 18, 1917. Defendant's answer filed on May 5, 1917.

Panama Railroad Company v. Eufracia C. de Villalobos and Porfirio Melendez: This is a suit for revindication of lands. The petition was filed on March 1, 1912.

Pedro Celestino Cerezo v. Eusebio Diaz et al. and the Panama Railroad Company as intervenors: This is an action brought to establish title to real property. The petition was filed on June 24, 1909.

Panama Railroad Company v. A. S. Mendez et al.: This is a suit brought for the recovery of land. The petition was filed on March 6, 1912.

Tomás Reina v. Beatriz Bracho et al. and the Panama Railroad Company, civil No. 139: This is a bill for the partition of lands known as Rio Indio y Mindi. The suit was filed on May 29, 1916. Appearance was entered on behalf of the Panama Railroad Company on June 17, 1916. The lands involved in the four cases just mentioned have been taken over by the United States under the President's depopulation order of December 5, 1912, and the parties claiming the property adversely to the Panama Railroad Company, except in the Tomás Reina v. Beatriz Bracho case, filed their claims before the Joint Commission. For that reason no disposition has been made of these cases.

MAGISTRATE'S COURT, DIVISION OF CRISTOBAL.

James Roberts v. Panama Railroad Company, civil No. 356: This is an action for damages in the sum of \$300 on account of false arrest and malicious prosecution. The case was set for trial on June 27, 1916, at which time, on the motion of the defending company, it was continued for a period of 60 days, for the reason that one of the material witnesses for the Panama Railroad is at present not on the Isthmus.

DISTRICT COURT, DIVISION OF BALBOA.

Theodore Bosse v. Panama Railroad Company, civil No. 119: This is an action for damages in the sum of \$10,000 on account of personal injuries. The case was filed on July 12, 1916; trial was had by jury on August 19, 1916, at which time a verdict was rendered for the plaintiff and damages assessed at \$2,500. Motion for a new trial was filed and overruled on August 26, 1916, at which time final judgment was entered against the railroad and notice of appeal given. Defendant company's bill of exceptions was filed on September 20, 1916, and the case was taken to the United States Circuit Court of Appeals for the Fifth Circuit at New Orleans, by writ of error. The judgment of the district court of the Canal Zone was affirmed by the Circuit Court of Appeals on February 5, 1917; thereafter the case was taken to the United States Supreme Court by writ of error, where it is now pending.

Mrs. M. F. Curran v. Panama Railroad Company, civil No. 168: This is a suit for damages brought in the sum of \$10,000 on account of personal injuries. The plaintiff has amended her complaint, and has increased her demand against the Panama Railroad to \$25,000. The complaint was filed on May 24, 1917. Demurrer to complaint was argued on June 21, 1917. The said demurrer was overruled on June 22, 1917; answer filed on June 28, 1917.

In conclusion I might say that this office rendered a number of opinions to the Governor and department heads of The Panama Canal, as well as to the president and other officials of the Panama Railroad Company during the last fiscal year; and has assisted the American legation in Panama with legal advice.

Respectfully,

FRANK FEUILLE,
Special Attorney.

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

APPENDIX J.

REPORT OF THE CHIEF HEALTH OFFICER, HEALTH DEPARTMENT.

BALBOA HEIGHTS, CANAL ZONE, *July 20, 1917.*

SIR: I have the honor to submit the following report of the operations of the health department for the fiscal year ended June 30, 1917:

ORGANIZATION.

The organization of the department, with a few exceptions, has remained unchanged during the year.

Maj. E. E. Persons, Medical Corps, United States Army, assistant chief health officer, was relieved from duty with The Panama Canal and ordered to military duty on May 6, 1917; the vacancy occurring has not yet been filled.

Lieut. Col. George D. Deshon, Medical Corps, United States Army, was relieved from duty as superintendent, Ancon Hospital, August 4, 1916, being replaced by Maj. A. E. Truby, Medical Corps, United States Army, on that date.

At Colon Hospital Maj. T. L. Rhoads, Medical Corps, United States Army, was replaced as superintendent by Capt. T. J. Leary, Medical Corps, United States Army, October 5, 1916.

Maj. F. F. Russell, Medical Corps, United States Army, was relieved as chief, board of health laboratory, May 31, 1917, being replaced by Capt. Oscar Teague, Medical Reserve Corps, who reported for duty June 9, 1917.

Other Army medical officers have been relieved from duty with the canal, due to war requirements, and the positions vacated filled by officers of the Medical Reserve Corps. The many changes in military personnel, especially in the higher positions, coming practically at the same time, have considerably embarrassed the work of the department.

GENERAL REMARKS.

The health of employees and nonemployees in the Canal Zone and terminal cities has continued good. No cases of yellow fever or plague originated on or were brought to the Isthmus during the year.

A case of smallpox in a West Indian sailor was admitted to Ancon Hospital, November 2, 1916, from Panama City. The man had been discharged at the port of Balboa a few days before from the British steamship *Coya*, recently arrived from South American ports, and the infection was contracted before arrival on the Isthmus. Two secondary cases, both in young children, occurred in the same house

from which the first case came, due to failure of first vaccination of contacts. One infant died; the other cases made good recoveries. The last case was admitted November 22, 1916.

The average number of employees on the rolls of The Panama Canal and Panama Railroad and of contractors doing work for The Panama Canal for the year was 33,998, as compared with 33,548 for 1916.

The gross cost of the health department for the year, including furniture, equipment, etc., was \$1,023,224.34, as compared with \$942,310.44 for 1916. The increased cost of the department has been balanced in part by the increased service rendered, as indicated by increased revenues accruing to the department, the revenues for the year, including services rendered other departments, totaling \$441,303.13, as compared with \$390,006.71 for 1916. The gross cost includes considerable permanent sanitary work in various districts of the Zone.

During the latter months of the year the military population has shown a decided increase. The number of women and children pertaining to military commands was 743, as compared with 869 in 1916. Among the troops there were 2,312 hospital admissions during the year, with 10 deaths. Malaria was given as the cause of admission in 267 cases.

A census of the Canal Zone was taken in June by the police department, and of Panama and Colon by the respective health officers during the same month. The population of the Canal Zone, including the military, shows an increase over that of the last previous census taken in June, 1916. In the terminal cities, Colon will show an increase, the population of Panama remaining practically the same as the last census. The morbidity and mortality rates in this report are based on the population as shown by the 1915-16 census; our rates, therefore, as shown, are considerably higher than would appear if based on the actual population as determined by the census now about being completed.

Tuberculosis continues to be the leading cause of death in the terminal cities, and its relative presence among the living can only be conjectured, though it is known to be great. Many cases do not come under the care of a physician, and therefore are not reported. In Panama the death rate from tuberculosis in all forms is 5.20 per thousand for the year; this rate is more than double the rate for the entire registration area of the United States. As noted in former reports, poor housing and adverse economic conditions are responsible in great part for this unfortunate showing. Recently the Panama Red Cross has been organized and has been able to render most valuable cooperation and assistance in furthering the infant welfare and antituberculosis work initiated by the health office, Panama. A free tuberculosis clinic has been established in the Red Cross building in the exposition grounds; all positive cases will be reported to the health officer, and it is hoped that definite information will be gained as to the location of foci of infection of this disease, which will enable the health officer to take proper preventive measures. The situation, however, will be unsatisfactory until proper facilities are provided for the segregation and isolation of cases of disease in active form. Under present conditions the hospital admits these cases, treats them awhile, and then discharges them uncured

with the lesions still active and the menace thus continues. Repeated representations have been made to the Panaman Government concerning the need for a sanitarium for the treatment of this class of unfortunates, but without result.

Rates for malarial diseases among our employees show continued improvement each year. The admission rate for 1917 is less than one-half that for the previous year. Malarial incidence in sanitated districts is at a minimum. Conditions as to residence of many of our employees have changed during the past year; these conditions have an important bearing on our malarial rates. The development of the cattle industry by the supply department has necessitated extensive jungle clearing in the Zone, and more recently farming and truck-gardening activities have been undertaken on a large scale, both of which have taken our laborers into unsanitated districts in which it has been impossible to satisfactorily safeguard them from malarial infection. In view of these new adverse and predisposing conditions, it is remarkable that our malarial rates have not shown an increase over those of the previous year; it appears that the increased number of admissions from laborers living in unsanitated areas has been more than offset by the marked reduction of malarial incidence in the districts under control. These conditions will continue for some time, it is feared, until construction work is completed and plantation and cattle centers are permanently established, which will permit of permanent sanitary work being done in and about them.

VITAL STATISTICS.

EMPLOYEES.

The average number of employees on the rolls of The Panama Canal, the Panama Railroad, and contractors doing work for The Panama Canal for the year was 33,998, as compared with 33,548 for the fiscal year ending June 30, 1916.

The total admission rate to hospitals and quarters was 310.40,¹ as compared with 301.09 for 1916. The total admission rate to hospitals only for the year was 141.86, as compared with 164.78 for 1916, and for disease alone, 105.62, as compared with 125.88 for 1916.

The total death rate for 1917 was 5.79, as compared with 6.65 for 1916, and the death rate for disease was 4.44, as against 4.98 for 1916. The noneffective rate for 1917 was 8.81, compared with 10.08 for 1916.

The total admission rate for malaria, hospitals and quarters, was 13.47, as compared with 34 for 1916, and 66.60 for 1915; the constantly noneffective rate, hospitals and quarters, was 0.49, as against 0.87 for 1916, and 1.29 for 1915. The death rate for malaria was 0.09, as compared with 0.15 for 1916, and 0.21 for 1915.

The admission rate for typhoid fever was 0.41, as against 0.18 for 1916; the death rate was 0.03, as against 0.12 for 1916. (Only one death from typhoid fever, as against four for 1916.)

The death rate from tuberculosis (various organs) was 1.14, as compared with 0.92 for 1916. The death rate for pneumonia was 0.71, as against 1.14 for 1916.

¹ All rates are based on the annual rate per 1,000 employees.

The five diseases causing the highest number of hospital admissions, with their rates, were as follows:

	Number of admissions.		Rate per 1,000.	
	1915-16	1916-17	1915-16	1916-17
Venereal diseases.....	575	533	17.14	15.67
Malaria.....	983	419	29.30	12.32
Influenza.....	99	151	2.95	4.44
Tuberculosis.....	128	126	3.81	3.71
Diseases of the eyes and annexa.....	169	110	5.04	3.24

The five diseases causing the highest number of deaths, with their rates, were as follows:

	Number of deaths.		Rate per 1,000.	
	1915-16	1916-17	1915-16	1916-17
Tuberculosis (various organs).....	31	39	0.92	1.14
Lobar pneumonia.....	38	24	1.13	.71
Chronic nephritis.....	19	16	.57	.47
Organic diseases of the heart.....	15	9	.45	.26
Apoplexy.....	6	7	.18	.21

EFFECTS OF SEASON.

The highest admission rates for disease occurred in May and August, and the lowest in September and November. The highest death rates for disease occurred in January and May, and the lowest in April and July.

EFFECTS OF RACE.

For disease only, the admission rate to hospitals and the death rate for white employees were 276.16 and 3.84, as compared with 78.39 and 4.54 for colored employees. The noneffective rate for disease and injuries for white employees was 17.78, as compared with 7.78 for colored employees.

The admission rate to hospitals and quarters for malaria was 33.32 for white employees, as compared with 10.30 for colored employees.

DEPORTATIONS.

The number of deportations among employees during the year was 50; 38 of these were suffering from disease and 12 from injury.

CANAL ZONE.

The average population of the Canal Zone for the year was 31,048, as compared with 31,384 for last year. From this population, 328 deaths occurred during the year, 278 of which were from disease, giving a rate of 8.95 for disease alone, as compared with 11.02 for 1916.

The death rate from tuberculosis was 1.16, as compared with 1.21 for the year 1916. Deaths from tuberculosis this year were 6.10 per cent of all deaths.

The birth rate for the year was 19.61. The infant mortality rate, based on the number of births reported for the year, was 37 for white and 179 for colored children, with a general average of 136. Of the total births reported, 6 per cent were stillbirths.

Of the total deaths recorded, 35 per cent occurred among children under 5 years of age.

PANAMA CITY.

The average population of the city for the year was 60,778, as compared with 60,576 for the preceding year. From this population, 1,766 deaths occurred during the year, of which 1,700 were from disease, giving a rate of 27.97 for disease alone, as compared with 27.27 for the preceding year. Tuberculosis gave a death rate of 5.20, as compared with 4.82 for 1916, being 18 per cent of the total deaths this year, as compared to 17 per cent of the total deaths for the preceding year.

The principal causes of death as compared with last year were as follows:

	1915-16	1916-17
Tuberculosis (various organs).....	292	316
Pneumonia (including lobar and broncho).....	190	248
Diarrhea and enteritis.....	265	271

There were 2,732 births reported for the year, giving a rate of 44.95. The infant mortality rate, based on the above number of births, was 245. Of the total births reported, 8 per cent were stillbirths.

Of the total deaths recorded, 50 per cent occurred among children under 5 years of age.

COLON.

The average population of the city for the year was 24,693, as compared with 27,012 for the preceding year. From this population, 639 deaths occurred during the year, of which 606 were from disease, giving a rate of 24.54 for disease alone, as compared with 24.51 for the preceding year.

The death rate for tuberculosis was 4.05, as compared with 3.05 for the preceding year, being 16 per cent of the total deaths this year, as compared to 12 per cent of the total deaths for the preceding year.

The principal causes of death as compared with last year were as follows:

	1915-16	1916-17
Pneumonia (including lobar and broncho).....	83	104
Tuberculosis (various organs).....	83	100
Diarrhea and enteritis.....	40	56

There were 859 births reported for the year, giving a rate of 34.79. The infant mortality rate, based on the above number of births, was 233. Of the total births reported, 6 per cent were stillbirths.

Of the total deaths, 41 per cent occurred among children under 5 years of age.

ANCON HOSPITAL.

PATIENTS.

The average number of patients constantly under treatment in Ancon Hospital during the year was 770, as compared with 748 for the year ending June 30, 1916. The average number of employees constantly sick in hospital was 226 for 1917, as compared with 267 for 1916.

The gross cost of the hospital for the year was \$462,577.45, as compared with \$394,991.37 for the preceding year. These figures include cost of operating the board of health laboratory and Corozal Hospital.

PERMANENT BUILDINGS.

In 1914 Congress authorized the expenditure of \$150,000 to begin the reconstruction of the hospital, of reinforced-concrete buildings. The first building of the permanent hospital to be completed was the crematory, which contains a chapel, receiving room, and machinery room. The building was turned over to the health department in January, 1916, and has been in continuous operation since. The first ward unit group was completed and turned over to the health department for occupancy by patients in June, 1916; it is known as section A, and consists of four 30-bed wards and the necessary service rooms.

The buildings completed in 1917 were the following:

(1) *Board of health laboratory.*—This building was occupied February 28, 1917. It contains laboratories for the director in research work, the bacteriologist, pathologist, chemist, entomologist, and undertaker; also offices, writing rooms, photographic studio, library, pathological museum, and a basement for experimental animals. All the departments are complete and are furnished with the most modern equipment. The board of health laboratory building and the crematory building, immediately adjacent, were connected together with a concrete walled and roofed passageway.

(2) *Section B.*—This unit was occupied April 10, 1917. It consists of 37 private rooms, 7 small wards, 2 cells, and will accommodate 106 patients—80 adults, 20 children, 6 infants. This group is provided with a complete maternity department, children's wards, wards and private rooms for white and foreign men and women. It has the necessary service rooms to make it a complete unit. The equipment throughout is modern in every respect, including such items as white enameled furniture, electric sterilizers, ranges, elevators, and call system.

(3) *Admitting office and dispensary.*—This building was occupied on May 8, 1917. It is a two-story building with offices, waiting and examining rooms, drug store, and dentists' rooms. Quarters for the

physicians, druggist, and attendants are provided on the second floor.

The present session of Congress has appropriated funds to complete the building program of the hospital. The buildings will be erected in the following order and as rapidly as possible:

(1) *Administration building*.—This is to be a three-story reinforced concrete structure. It will contain rooms for the medical, eye and ear, and X-ray clinics on the first floor; administration offices, library, and file rooms on the second floor; and surgical department on the third floor. In the basement there will be a complete drug manufacturing department and drug store. Work on the building is progressing rapidly.

(2) *Kitchen and mess building*.—This will be a two-story structure with modern equipment throughout. Large dining rooms are provided for doctors and nurses as well as convalescent patients of all classes. Excavation for the building is now in progress.

(3) *Isolation building for contagious diseases*.—To consist of three stories and basement. This building will contain rooms and small wards for isolating and treating cases of contagious diseases. The second and third floors are especially planned for patients suffering with tuberculosis. It will be modern throughout. Preparation of the site for the building is now under way.

(4) *Nurses home*.—Three stories and basement will be erected on a splendid site, centrally located. Work will probably begin on this structure about August 1, 1917.

(5) *Ward buildings*.—Two 3-story buildings, each containing 6 wards of 30 beds, a total of 360 beds. These buildings will be so constructed that each ward can have any class of patients without interfering in any way with the class of patients in other wards of the same building. Construction work on this group will begin during the next dry season.

(6) New quarters for the superintendent on the site of the present nurses home, and a carpenter and plumber shop and garage, will complete the building program as authorized.

Ancon Hospital, when finished, will be the largest and most modern of any hospital owned by the United States Government. The new hospital buildings will be more centralized than those of the old French Hospital. Covered corridors will connect all buildings. It is believed that the entire plant will be completed before the close of the year 1918. The new buildings will accommodate 610 patients, exclusive of the isolation building which will have accommodations for 80 beds if necessary.

The old section F site will be reserved for future expansion if the increase in the canal population (including the military forces) demands a larger hospital. This site is large enough to accommodate buildings that would increase the hospital bed capacity to 1,000 or more.

BOARD OF HEALTH LABORATORY.

Pathological report.—There were 343 autopsies performed during the year, the cause of death being recorded, as follows:

Typhoid fever	5
Malarial fever, estivo-autumnal	10
Smallpox	1

Measles	1
Whooping cough	2
Dysentery, entamebic	1
Dysentery, bacillary	1
Erysipelas	1
Purulent infection and septicemia	1
Pyemia	7
Pyemia and septicemia, pneumococcic	2
Pellagra	11
Beriberi	10
Tuberculosis of the lungs	29
Acute miliary tuberculosis	6
Tuberculous meningitis	1
Tuberculosis of the genito-urinary organs	1
Disseminated tuberculosis	33
Syphilis, tertiary	12
Syphilis, hereditary	2
Cancer and other malignant tumors of the stomach and liver	1
Cancer and other malignant tumors of the peritoneum, intestines, rectum	1
Cancer and other malignant tumors of the female genital organs	2
Cancer and other malignant tumors of the breast	1
Cancer and other malignant tumors of other organs and of organs not specified	3
Diabetes	3
Hodgkin's disease	2
Anemia, secondary cause not determined	1
Encephalitis	1
Simple meningitis	3
Cerebrospinal fever, epidemic type	1
Pneumococcus meningitis	3
Other diseases of the spinal cord	1
Cerebral hemorrhage, apoplexy	3
Softening of the brain	4
General paralysis of the insane	6
Convulsions of infants under 5 years of age	1
Other diseases of the nervous system	2
Pericarditis	2
Malignant endocarditis	3
Organic disease of the heart	7
Diseases of the arteries	2
Aneurism	6
Arteriosclerosis	5
Embolism and thrombosis	1
Broncho-pneumonia	7
Pneumonia (unqualified)	1
Lobar pneumonia	18
Empyema	2
Gangrene of the lungs	2
Abscess of the lungs	3
Diseases of the mouth and annexa	2
Diseases of the esophagus	1
Diarrhea and enteritis (under 2 years)	4
Colitis	1
Diarrhea and enteritis (2 years and over)	1
Hernia, intestinal obstructions	2
Intestinal obstruction	2
Duodenal ulcer	3
Cirrhosis of the liver	1
Abscess of the liver (unqualified)	1
Other diseases of the digestive system (cancer and tuberculosis excepted)	1
Bright's disease (chronic nephritis)	18
Other diseases of the kidney and annexa	3
Pyelonephrosis	7
Diseases of the urethra, urinary abscess, etc.	3
Stricture of the urethra, nonvenereal	2
Diseases of the uterus	1

Salpingitis and other diseases of the female genital organs.....	1
Puerperal hemorrhage.....	1
Puerperal septicemia.....	3
Eclampsia.....	3
Gangrene.....	2
Carbuncle.....	1
Diseases of the bones (tuberculosis excepted).....	1
Congenital malformations (stillbirths not included).....	3
Congenital debility, icterus, and sclerema.....	1
Premature birth.....	3
Malnutrition.....	4
Marasmus.....	1
Other causes peculiar to early infancy (including various consequences of labor).....	2
Suicide by drowning.....	1
Acute poisonings.....	2
Burns (conflagration excepted).....	2
Absorption of deleterious gases (conflagration excepted).....	1
Accidental drowning.....	3
Traumatism by firearms.....	2
Traumatism by fall.....	2
Traumatism by machines.....	1
Traumatism by other crushings (vehicles, railroads, landslides, etc.).....	4
Railroad traumatism.....	3
Injuries by animals.....	1
Other external violence.....	1
Cause of death not specified or ill-defined.....	2
Infections of undetermined origin.....	2
Stillbirths.....	2

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The routine work performed at the laboratory appears in Table XXII, appended.

Work other than routine.—The introduction into the Canal Zone of the cattle, hog, and chicken industries on a large scale by the supply department has necessitated a more intensive and general study of veterinary medicine by the board of health laboratory, in order that its staff might become more efficient in supporting the veterinarians in charge of the work. This new venture has opened an almost virgin field in tropical veterinary medicine in this part of the world, as the laboratory problems associated with such work have been given but scant attention. Argentine, Chile, Brazil, Mexico, and some of the West Indies have offered some facts pertaining to animal diseases, but little is known concerning their prevalence in the intervening countries.

Dr. S. T. Darling (former chief of the laboratory) showed that equine trypanosomiasis and piroplasmosis occur in Panama and demonstrated the presence of anthrax in cattle and of hog cholera among the hogs at Corozal Hospital farm. His successor, Maj. F. F. Russell, made a more intensive study of anthrax in cattle, which appeared in epidemic form during the past two years, and took a leading part in devising methods for its control. Dr. H. C. Clark, pathologist on the laboratory staff, discovered the presence of piroplasmosis (*B. bigemina*) in cattle, and demonstrated that it is almost universal among native cattle, which act as "carriers" of the disease; while imported cattle are seriously affected by it—often fatally. Following this work, measures were instituted which have controlled the disease in great part. Recently the laboratory has succeeded in cultivating a trypanosome from the blood of beef cattle

apparently in good health; the indications are that it occurs in scant numbers in the peripheral blood of a large percentage of the native cattle. Its pathogenic properties have not yet been studied.

It is the intention to survey as many wild and domestic animals and fowls as the routine work will permit. These animal "carriers" of parasites may prove to be reservoirs from which economically important diseases can be transmitted to domestic or imported stock. A good start has already been made on this survey, as is shown by the following list of blood and muscle parasites of animals observed at this laboratory by Dr. Clark during the past year:

Group 1.—Heavy infections involving a large percentage of the animals examined:

- (a) Piroplasmosis in cattle.
- (b) Sarcosporidiosis in cattle, hogs, buzzards, wild turkeys, and goats.
- (c) Hemoproteus in wild turkeys and buzzards.
- (d) Microfilaria in wild turkeys and buzzards.

Group 2.—Isolated observations on a few animals only:

- (a) Piroplasmosis in deer and dogs.
- (b) Trypanosomiasis in a wild monkey and a wild fowl (Perdes de Arca).
- (c) Hemoproteus in an owl and in parrots.
- (d) Sarcosporidiosis in a cat and a sheep.
- (e) Spirochaetosis (Theileri ?) in a bull.

Both domestic and wild animals in Panama are infested with ticks, lice, fleas, and mites, which are undoubtedly instrumental in transferring blood parasites from one beast to another. These ectoparasites will probably play the same prominent rôle with regard to the development of animal industry in the Canal Zone that the mosquitoes did with regard to the sanitation of the Zone. Our entomologist is planning to study the life history of the more important of these ectoparasites.

COROZAL HOSPITAL.

Buildings.—The type 17 house formerly used as an office was remodeled into a home for female nurses, the office being moved into the larger adjacent building previously used as a storeroom. A new chicken house with a capacity of 2,000 chickens was completed. The kitchen was remodeled, the roof raised, and a new range, steam cookers, and steam coffee and tea urns installed. Two additions, one on either side, were made to the piggery, thus doubling its capacity. A new vegetable house, an implement house, and a house for guinea pigs and rabbits were constructed. In connection with the dairy a 1,500-gallon capacity dip was constructed, with a view of eradicating ticks. The results have been satisfactory in that the cows are in better condition and the milk production increased.

Hospital department.—On June 30, 1917, there were 350 patients, as compared with 291 of the same date in 1916. The entire method of handling patients has been changed to conform to that which obtains in the best institutions in the States; patients are receiving more individual attention and treatment by doctors and nurses who have specialized in this work. The records are full and up to date, and in favorable cases exhaustive histories are kept. Hydrotherapy is used in as many cases as possible. Through the courtesy of the bureau of clubs and playgrounds moving pictures are shown twice

a week. A phonograph furnishes music for the pictures as well as for concerts in the wards. Weekly services have been provided both for those of Catholic and Protestant belief. Patients unable to work outside are given daily exercises. Every patient who can work is given something to do, either in laundry, sewing room, garden, grounds, kitchen, or in making hats, this is not only excellent treatment, but keeps them occupied. The Army has furnished several band concerts, and an effort is being made to obtain the visits of the band more frequently. During the year in connection with the hospital kitchen, a garden has been put in by the patients. This flourished, and in June over \$100 worth of produce was gathered. Over 1,200 hills of yams have been planted, as well as a large field of sweet potatoes, which promise a good return.

FARM DEPARTMENT.

Dairy.—The demand for fresh milk is so great that we are able to supply only those who furnish physicians' prescriptions, though the milk production has greatly increased. Daily checks are made on the bacterial count of the milk. The count usually falls below 100, and as a daily average will fall below 500 per c. c. It is doubted if purer milk can be found elsewhere, as the certified milk of the States is allowed a margin of 10,000 bacteria per c. c. With the cleanliness the quality remains the same, the fat content averaging between 4 and 5 per cent. Diseases such as mastitis and contagious abortion, which were a source of trouble, have been practically eliminated. The herd is tested for tuberculosis at regular intervals. The herd has been increased by stock purchased from the supply department, and unprofitable cows have been condemned. On the whole, the cows purchased from the supply department have done as well as those purchased in the States.

Piggery.—At the end of the year the stock showed a total of 250, divided as follows: Four registered boars, 1 grade boar, 58 hogs, 85 pigs, and 102 sucklings; as compared with a total of 210 on June 30, 1916. This department has not shown a profit, due to the expense of immunizing the animals to hog cholera and to the high cost of imported feed.

Poultry.—Five hundred Rhode Island Red hens were purchased in the States and delivered in January. On the basis of the new stock it is hoped to build up a fine strain of producing chickens.

Garden.—The scope of the garden and produce has been greatly increased. Despite the great decrease in prices of truck vegetables and the increase in number of cripples able to do very little work, the garden has made a better showing than last year.

General.—On the whole, the farm has been placed nearer a self-supporting basis than ever before. In May the total net cost of farm and maintenance of cripples was only \$52.99; and for the month of June available figures show a net cost of only \$46.01.

SURGICAL CLINIC.

During the year 1,506 major and 1,415 minor operations were performed, and 252 obstetrical cases were delivered. Cases treated in the out-patient department numbered 2,911.

MEDICAL CLINIC.

There were 3,398 cases treated in the out-patient clinic. Prescriptions numbering 3,060 were written. Three cases of smallpox were treated; two recoveries and one death (a child 6 months old). Two mild cases of anterior-poliomyelitis were treated. One case showed paralysis of the deltoid group of muscles, left side. The other case had no permanent disability.

EYE AND EAR CLINIC.

Total visits to out-patient department	6,248
New cases to out-patient department	2,511
Prescriptions written	693
Refractions	1,225

There were 736 operations performed on clinic and hospital patients.

X-RAY CLINIC.

The following equipment was added during the year: Two intensifying screens, printing frames, steel office desk and steel filing equipment.

STEWARD'S DEPARTMENT.

Necessary upkeep repairs were made on present equipment. A new stack was placed on the vertical boiler, also one on the range. The boilers were partially retubed. Mess pantry was remodeled and new steam table installed. Rations served to patients and personnel entitled to same numbered 223,743; cost, \$66,678.25. There were 257,748 pounds of bread baked, at a cost of \$10,134.76.

TRANSPORTATION.

The only animal transportation at present in use is a double-team brake used two hours each day to meet hospital trains, the balance of transportation having been motorized, as follows:

- A 1-ton truck placed in service during March, 1915.
- A 1½-ton truck placed in service during December, 1915.
- A hearse placed in service during September, 1915.
- A heavy chassis ambulance placed in service during April, 1916.
- A light chassis ambulance placed in service during October, 1916.
- A light chassis touring car placed in service during August, 1916.
- A 1-ton trailer placed in service during June, 1916.

The above replaced eight double teams and two single rigs. American chauffeurs at \$125 per month replaced alien negro chauffeurs at \$40 per month on the two trucks.

Since placed in service motor transportation has made a total saving under the cost of animal transportation it replaced of \$5,255.54.

GROUNDS AND POLICE.

New boundary lines were defined for the hospital reservation which removed the following buildings from the limits previously obtaining: Nos. 201, 518, 520, and 522 (all family quarters); 334

(admitting office and dispensary), and 335 (bachelor quarters for personnel on duty in dispensary). As heretofore, fruits from plants and trees in the hospital reservation were gathered and turned in to the kitchen for patients' consumption. The usual care was taken of lawns, gardens, etc., and every effort was made to save plants for use around new buildings. Hospital forces continued police of wards and around buildings of hospital proper only.

COLON HOSPITAL.

The work at this hospital has increased during the year. It is probable that the demands at this end of the line will require, in the near future, a larger plant than originally planned. The construction of a new ward for contagious diseases and the utilization of the 10-bed ward in hospital annex which is now used as dormitory for attendants will permit of nearly doubling the present bed capacity, without a great increase of hospital personnel. The hospital group consists of hospital and dispensary building, doctors' quarters, morgue, garage, and storerooms, all of permanent concrete construction; in general, the buildings are satisfactory. The paint on the interior of hospital building has peeled badly and fallen off from large areas, rendering it unsightly and making it difficult to keep the wards clean with the constant peeling of the paint. The entire interior of hospital building will require repainting this year.

Another item of expense in upkeep is the constant renewal and repairs to screening on hospital building, made necessary by the corrosion of the wire on the sea side of the building, due to constant salt spray.

The grounds have been filled and graded to the level of the fill in the adjoining town site of New Cristobal.

A new set of concrete quarters for nurses, which will be constructed the coming year, will complete the hospital group as originally planned. A small concrete building will be required to house workshop and provide room for the storage of coffins and hospital property on the survey list, the construction of which will permit of the demolition of the present unsightly galvanized iron storeroom, and later of the old stable, of which the carpenter shop is now a part.

The dispensary service has been large and exacting, and it is believed has given general satisfaction.

PALO SECO LEPER ASYLUM.

The average number of patients constantly cared for during the year was 66.21. There were 65 patients at the beginning of the year; 12 were admitted, 11 died, and 1 was discharged (escaped), leaving 65 patients under treatment at the close of the fiscal year.

Two new ward buildings have been completed during the year, the labor being performed by patients under the supervision of the superintendent. One of the old ward buildings was reconstructed and fitted up as an infirmary, operating room, and dispensary; this provides accommodations for more serious cases requiring the constant care of an attendant. The superintendent's office has been

enlarged and the chapel removed to a site in line with the ward buildings, a central space thus being afforded for a small park.

A new well from which the water supply of the asylum is obtained, has been sunk to a depth of 147 feet, thus providing a more ample supply of water. Connections have been made to the asylum's water system for supply of the military subpost, about 2 miles west of the asylum; the military obtain their supply from this source, for which a moderate monthly rental is charged.

SANTO TOMAS HOSPITAL.

The average number of patients constantly sick was 440, as compared with 451.92 for the previous year. The number of days relief furnished patients was 160,781, as compared with 165,402 the preceding year.

The delay on the part of the Panaman Government in making provision for the accommodation in separate wards of tuberculosis cases, and insolation wards for cases of acute contagious disease, causes embarrassment to the hospital authorities. The necessity for a separate building for tuberculosis cases was commented on in my last annual report. The Panaman Government has been asked many times during the past year to authorize alterations and additions to the present buildings in order to meet immediate necessities. The Panaman authorities have agreed to the project in principle, but the work has been delayed from time to time on one pretext or another, and the end of the year finds the hospital without these most necessary facilities. The Panaman Government is now considering the project of building a new hospital in the exposition grounds, and abandoning the present hospital group. A new hospital is needed and should be constructed as early as possible, but the urgent immediate need is for the alterations and additions of a temporary nature to the present hospital. A new hospital can not be constructed, equipped, and ready for occupancy within the period of two years, and meanwhile the temporary construction for the present hospital group as recommended should be authorized.

DISTRICT DISPENSARIES.

Five dispensaries, not including those at Ancon and Colon Hospitals, have been maintained during the year.

A new concrete dispensary building is nearing completion at Pedro Miguel. This will provide offices for the district physician, district sanitary inspector, and district dentist, and on the second floor living quarters for gold employees.

A concrete dispensary building for Gatun will be constructed the coming year.

MEDICAL STOREHOUSE.

The value of drugs and miscellaneous medical and surgical supplies and equipment issued during the year was \$121,126.98.

SANITATION.

CANAL ZONE.

Sanitary work of a permanent nature has been completed during the year in and around our Zone towns, as follows:

	Tile drain.	Concrete ditches.
	<i>Feet.</i>	<i>Feet.</i>
Balboa district.....	5,567	1,928
Ancon district (including Corozal).....	2,979	7,256
Pedro Miguel-Paraiso.....	23,071	13,005
Gatun.....	10,534	7,380
Cristobal-Mount Hope.....	1,680	7,665
Total.....	43,831	37,234

Extensive hydraulic and dry fills have been completed in the Mount Hope-Cristobal district. The hydraulic fill of swamp No. 2 adjoining the French canal was the most extensive project in this district. While the fill proper is completed, there remains the installation of concrete ditches in this area which it was not considered advisable to undertake until the fill had properly settled; funds to complete the work remain available.

The project of reclaiming the swamp areas in Balboa Flats between the old and new Ancon-Corozal roads is nearing completion. A comprehensive drainage system has been laid out through this fill, though only the main artery has been concreted. Additional permanent drains will be required when the fill proper is completed. This work has done away with extensive anopheles-breeding areas and will reduce expenses of maintenance to a minimum.

The value of the work in the Mount Hope district from an anti-mosquito viewpoint is evidenced by the almost complete disappearance of anopheles and the practical elimination of malaria from among employees living at the Atlantic terminal.

Flies have been quite numerous in the Zone recently, due to the use of untreated manure in vegetable gardens. On account of war conditions, employees have been encouraged to make gardens, to increase local food supplies, and tracts of land have been set aside in all districts for this purpose. The supply of composted manure was insufficient for the demand and fresh manure was used to such an extent that it was necessary to recommend that its use be stopped on account of the fly nuisance, and a Governor's circular was issued to that effect. District quartermasters have been instructed to see that compost pits are constructed of sufficient capacity to treat all manure before its sale as fertilizer.

A modern oil-burning incinerator of 120 tons daily capacity is now being erected on Gavilan Island, where it will serve the districts of Ancon, Balboa, and Fort Grant, as well as the city of Panama. The abandonment of the present insanitary garbage dumps will tend to reduce materially the fly and rat nuisances at these points. A similar incinerator of smaller capacity will be erected at Colon during the coming year.

PANAMA CITY.

General health conditions continue to show improvement as regards malaria and other communicable diseases, with the single exception of tuberculosis, the prevalence of which is commented upon elsewhere in this report.

A veterinarian has been added to the organization, whose duties include meat and market inspection, inspection of live stock in transit across the Isthmus, hide disinfection, and such other professional services as may be required. This official replaces one sanitary inspector who resigned during the year.

The registration of midwives under the new sanitary ordinances has been accomplished during the year. Births are now being reported to the health officer under the new ordinances.

Building operations have been quite active in Bella Vista and also in the Savannas district. A sanitary survey of the town of Pueblo Nuevo was undertaken and much sanitary progress made in roads and drainage and refuse disposal.

The annual vaccination of the school population not previously vaccinated is now in progress.

Malaria.—A gratifying decrease in this disease is hereby recorded. There were reported from all hospitals and embracing the entire population during the fiscal years ending June 30, 1915, 1,582 cases, June 30, 1916, 304 cases, and June 30, 1917, 226 cases. For employees alone there were reported: June 30, 1915, 589 cases, June 30, 1916, 68 cases, June 30, 1917, 62 cases.

It is interesting to note that the week ending February 17, 1917, is the first week on record since the beginning of the canal construction that there have been no admissions for malaria to any hospital. The highest number of cases admitted in any one week during the past year was that ending January 6, 1917, during which time there were 2 admissions of employees to Ancon Hospital and 13 nonemployees to Santo Tomas Hospital. To accomplish this result approximately 30 miles of drainage ditches are maintained and continuous vigilance of well-trained and efficient sanitary inspectors with appropriate silver forces is required. It is believed that this year's figures approach the possible low-water mark for malaria until more attention is given the carrier question and the problem of the sanitation of interior communities. There can be imposed no restriction in visiting these places, and most of them are endemic foci of the disease.

Pellagra and beriberi.—There were 35 cases of pellagra and 18 cases of beriberi reported. These deficiency diseases, involving as they do the economic problem of the lack of proper food, will, it is believed, continue uninterruptedly until economic conditions improve.

Room disinfection.—No terminal disinfection was done except in the smallpox cases. Approximately 200 rooms were treated by washing down the walls and floors with larvacide solution following occupancy by tuberculosis cases; this for the mechanical cleansing as well as disinfection. In many of these rooms we were able to get the landlord to repaint also.

Infant welfare.—Although this department has been in operation only six months, it is doing splendid work with encouraging results.

The Panama Red Cross has established and maintained a station in its building in the exposition grounds, which has materially lightened the burden of the health office. Headquarters of our district nurse continue in Santo Tomas Hospital. The scope of the work has included the visiting of babies in the homes, seeing them at the station, instruction given to mothers, the taking of histories, the hospitalizations of appropriate cases, etc. From January to June, inclusive, the following data are offered:

Station work:	
Number of babies seen.....	1, 682
Instruction to mothers.....	1, 127
Treatments given.....	303
Outside work:	
Total visits made.....	6, 804
Cases not located.....	162
Moved out of city.....	159
General:	
Number of babies breast fed.....	977
Number of babies bottle fed.....	57
Number of babies breast and bottle fed.....	687
Number admitted to hospital.....	40
Number treated at dispensary.....	94
Number of destitute cases assisted.....	27
Diseases found:	
Skin diseases.....	78
Whooping cough.....	9
Chicken pox.....	4
Babies died.....	29

GENERAL SANITATION.

Rats.—A very large percentage, almost all in fact, of the buildings in this city have been rat-proofed. Trapping is carried on systematically as a routine duty of the inspectors. Each rat caught is sent to the board of health laboratory under label so that an infected one may be at once localized. The large percentage of catches has consisted of the *Mus rattus* and the *Mus norvegicus*. The predominance of the *Mus musculus* being considered the index of success in "deratization," their paucity here leads to the opinion that the rat work will have to be energetically prosecuted. The catch for the year was 12,158.

Flies.—Fly-breeding places have been routinely eliminated during the year. Larvacide has been widely employed to this end, and the cooperation of all householders has been striven for. The principal fight has been at the source, viz, manure and garbage disposal, but attention has also been given to trapping.

Stables.—The erection of the Panama Railroad stables on B Street in South Panama, where sanitary stalls for horses may be rented at a reasonable charge, has tended toward the segregation of these establishments. This has resulted in reduction in fly-breeding and rat infestation. The stable situation, with the nonissuance of permits for new construction and repair, will take care of itself in the future, it is believed. This consummation will be attained through enhanced real estate values in the city which will render their continued occupancy of city lots unprofitable to their owners. A number of the older stables in the urban district have been eliminated during the year.

Building inspection.—Work done during the year as follows:

Buildings inspected (by district inspectors and building inspector) -----	56,996
Plans approved -----	157
Permits for repairs issued -----	1,029
Buildings condemned -----	125
Buildings demolished -----	52

It is worthy of note that building in the Savannas was energetic during the year, quite a number of substantial and some modern residences being erected.

Food inspection.—Regular inspections have been made of bakeries, hotels, restaurants, clubs, bottling works, dairies, and markets, as follows:

Dairies -----	284
Milk samples taken -----	48
Hotels, restaurants, etc -----	255
Bottling works -----	89
Bakeries -----	275
Other inspections -----	1,013

Notices were served on 156 owners. Considerable improvements in all departments of this work have been made. Notable improvements are the erection of several new and modern dairies in the environs of the city.

Street cleaning and garbage collection and disposal.—No change in street-cleaning methods has been instituted, the present system being both economical and adequate. One silver laborer is assigned to a certain section of a street or streets and is held accountable for its cleanliness. The system allows each man to cover his territory several times daily.

Garbage collections have continued by wagon transportation. An average of 4,777 loads per month has been handled—approximately 8,598 cubic yards. Plans have been approved for a motor truck for collecting this material, which will be tried out at an early date. This modernizes the collection and will prove an economy. It might be mentioned in this connection that the single item of transportation by wagon has amounted to \$868 per month as a minimum for the past year.

Garbage disposal hereafter will be by an incinerator whose erection is now in progress on Gavilan Island, adjoining south Panama. This new installation will eliminate serious nuisances, the prolific breeding of flies, rat infestation, stegomyia breeding in old cans, and other containers, etc. Concrete bins are to be erected in a series for the "curing" of manure, and it is expected that the cured manure will find a ready sale, the revenue from which should materially reduce the overhead expense of maintenance and operation of the plant.

COLON.

The present system of recording vital statistics has been in use only 18 months and there has been a marked improvement in the accuracy and regularity of reporting births and deaths.

Malaria.—In general, the malarial incidence has been lower than ever before. Several times there were no cases at all recorded in the weekly reports, and the rate at the beginning of the rainy season of

1917 has been exceptionally low. The number of cases reported for 1917 was 158; the number of mosquito-breeding places eliminated, 1,008. The extensive filling, grading, ditching, and draining of the swampy areas around Mount Hope has materially contributed to the lowering of the mosquito incidence, and a further improvement is hoped for as a result of sanitary improvements under way around Coco Solo on the east shore of Folks River, from which locality flights of anopheles have been coming to Colon every year. During the months of May and June, 1917, but one case of malaria was reported. The malarial curve on our chart for 1917 has been running uniformly much lower than in previous years. It touched zero four times in six months in 1917. The latter half of 1916 was also uniformly below that of the previous year. The malarial record of Colon was entirely negative for March and April, 1917.

Other communicable diseases.—The system of having all communicable diseases reported promptly by hospitals and private physicians, commenced in 1915, is now working well. During this year there were the following cases reported besides malaria:

Tuberculosis.....	67	Chicken pox.....	22
Diphtheria.....	4	Yaws.....	1
Pneumonia.....	1	Pellagra.....	6
Typhoid fever.....	3	Mumps.....	1
Measles.....	15	Meningitis.....	1
Whooping cough.....	33		

General sanitation.—There are four districts under the health office—Mount Hope, Cristobal, South Colon, and North Colon—each in charge of an inspector. There is also one inspector in charge of street cleaning and garbage collection, one building inspector, and one assigned to food inspection. The building of New Cristobal will require probably a redistricting of the city.

Some general improvements have facilitated sanitation, such as the hydraulic filling and subsequent grading of the large area in East Colon near the radio station occupied by New Cristobal, the filling and grading of Colon Hospital grounds, the installation of a new storm sewer from G Street to the sea, the filling in and building upon many vacant lots, the reclamation of the area south of Ninth Street adjoining the Panama Railroad stables, the construction of a sea wall and the filling of the beach adjoining Battery Morgan, the filling of the pond near the electric substation at Camp Bierd in Cristobal, and the elimination of a number of swamps in Mount Hope, as well as the substitution of concrete for macadam in several of the streets of Colon. The new Cristobal Hotel has also solved the trouble long experienced with the old hotel, while the completion of the handsome new school building is also of some sanitary value.

Garbage collection.—The method of garbage collection and incineration at the dump has been continued, but plans are under way for the construction of a modern incinerator plant. Manure is now cured in concrete vats before being allowed for use in gardens, a measure appropriate to the needs of the movement for raising garden supplies which has been stimulated by the war conditions. Garbage from ships is collected by the receiving and forwarding agent and assembled on the docks, whence it is handled by the health office. Two large fires in the past year increased the work of rubbish

removal temporarily. The great area of the fire of 1915 has been almost rebuilt in concrete, greatly to the betterment of the south half of the city.

Street cleaning.—This work has proceeded along the same lines as formerly, somewhat complicated by the extensive building operations and the practice of using the streets for assembling materials during construction, but a minimum of this custom has been insisted upon. The old system of catch basins for street débris, always fruitful of undesirable results, has been abandoned in the design of New Cristobal and is to be eliminated in Colon as soon as practicable.

Water and sewage.—A new pump and pump house has been erected in East Colon to serve the uses of New Cristobal. The sewage main has been relaid and carried out in front of the quarantine station instead of emptying in Folks River. The sewers on Colon Beach near Battery Morgan have been lengthened and carried beyond the new sea wall there to deep water, one of the most valuable of recent improvements. No infection has been traced to the drinking water of the district during the past fiscal year, and it is believed to be of exceptional purity.

Hotels, restaurants, bakeries, and markets.—The hotel situation has materially improved by the completion of the Cristobal Hotel, of the Aspinwall, and by the renovation of the Imperial and the remodeling of its kitchen. Six cafés and restaurants were closed, and several others were temporarily closed until they conformed to sanitary requirements. Colon market has been inspected daily and new plumbing fixtures, notably metal sinks and new drains, have been installed. The needs of the city will probably require additional market facilities before long, and any new market should be located near the water, preferably somewhere along Folks River.

Piers and docks.—Pier No. 7 was completed and put into commission. Pier No. 4, located just north of the Strangers' Club, has been razed during the year. The docks are inspected thrice a week, and rat work is carried on there daily.

Building operations.—There has been a building boom in Colon. In addition to the rebuilding of the three large areas devastated by fire in the last two years, there has been a steady process of building new apartment houses and cottages in other parts of the city also. Eighty-four plans were approved, 104 permits to occupy were issued, and 520 permits to repair were issued during the year. The rebuilding of many of the burned houses has made it feasible to eliminate certain long-standing structurally defective buildings which had been allowed for special reasons to remain unaltered in previous years.

Flies.—This district has long been noted for the relative absence of flies, due mainly to the concentration of stables and the proper handling of manure. An increase in flies was noted as a consequence of the opening of a soap factory in East Colon, which was made to abate the nuisance. A further increase was noted coincidentally with the increase of the number of vegetable gardens in the city and environs. This was undoubtedly due to using fresh manure instead of the "cured" product for fertilizing, largely through ignorance of sanitary requirements in the premises. Appropriate steps have been instituted through the press and by word of mouth to correct this ignorance and to abate the nuisance. The new type of metal

and concrete garbage stand is also promotive of decreased fly breeding. The use of larvacide in disinfecting small areas which are hard to clean completely, and the progressive elimination of these places, has also reduced fly incidence.

Rats.—The number of rats caught in the year was 5,125. One of the centers of rat infestation is the garbage dump, a fact which the erection of the incinerator plant will eliminate. The new concrete piers have materially diminished rat incidence, as well as the extensive concrete buildings in Colon. Most of the rats are *Mus musculus*, though *Mus norvegicus* and a few *Mus rattus* are also caught. The Marti cage trap has proved very efficient, and the use of anise oil has been shown to be extremely effective. A number of rats harbor in the coral rock holes along beaches, indicating the value of sea walls and filling of beaches in this connection. A large part of the catch in the latter part of the year has consisted of *Mus musculus*, which is taken by experts on "deratization" to indicate that the problem is well in hand. An extensive antirrat campaign was inaugurated during the latter part of the fiscal year, which included proper disposal of grains and other food materials and proper elevation of lumber and other materials and extensive trapping; this resulted in a gratifying increase in the catch in this district. This went on to the extent that it produced a decided fall in the monthly catch, naturally surmised to be due to their actual reduction in numbers.

Mosquitoes.—In addition to the remarks under the head of "malaria," it is noteworthy that most of Colon's mosquitoes are due to crabholes, in which *Taeniorhynchus* harbor after breeding out in the soft mud. Many of these holes were oiled, but until they are eliminated they will always be a source of this variety of mosquito. There are over 200 acres of land honeycombed with these holes in East Colon alone. Some flights of *Culex* and *Anopheles* both were noted coming from across Folks River. *Stegomyia* incidence is practically at a minimum.

Permanent work.—Several of the general improvements have been referred to under the heading "General sanitation." One of our inspectors was detailed to work on the submarine base and aviation field at Coco Solo, from which 458 acres of vegetation were cleared and 561 linear yards of ditches installed. This locality is the seat of mosquito breeding, which has always affected Manzanillo Island across the Folks River estuary of Limon Bay, and the reclamation of part of it, with the probable progressive extension of the work in the future, should tend to diminish the mosquito incidence at the Atlantic terminal. The conversion of several large swampy areas around Mount Hope into permanently elevated and drained land has been productive of excellent sanitary results. The erection of a bridge over the East Mendi diversion on the Mount Hope-Gatun Road, in place of the earth dike there before, has lowered the level of the diversion as well as increased the salinity of its waters and has been beneficial accordingly.

QUARANTINE DIVISION.

The total number of vessels inspected in quarantine, including Bocas del Toro, during the year, was 3,001, as against 2,238 for the preceding year, and 2,282 for the fiscal year 1915. The maximum

number of ships received in any one month was 252 in October, 1916, the minimum number, 219, occurring in November, 1916; these figures are exclusive of Bocas del Toro, and refer to quarantine entries at the canal terminals.

The general work at the two quarantine stations has been mainly routine, and without special incident. At Colon quarantine station, 45 poliomyelitis suspects from New York were detained for observation during August and September, 1916, all proving negative for the disease. One steamship captain was fined for violation of quarantine regulations, and one for violation of immigration regulations.

In October, 1916, yellow fever was officially reported in the islands of Martinique and Barbados; later reports indicate that probably yellow fever did not exist in Barbados.

The plague situation along the west coast of South America remains practically unchanged, and it is still necessary to consider the coast line infected from the small northern Ecuadorian ports to as far south as Valparaiso, Chile. Guayaquil, Ecuador, has shown the heaviest infection for both bubonic plague and yellow fever of all the coastal cities, and the situation in this city is still a menace to outgoing shipping. The plague situation in New Orleans has shown great improvement, though an occasional case of rat plague is discovered from time to time.

The anthrax situation among the cattle on the old pastures near Colon has shown marked improvement from the preceding year, this being the fourth year in which the disease has appeared in considerable numbers. In July, 1916, there were 20 deaths from this disease; August showed 22; November, 14; March, 15; and April, May, and June several cases each. The majority of these cases were diagnosed by microscopic examination, though some cases were considered positive where it was not possible to confirm the diagnosis by this method. The extensive preparations by the supply department in the construction of new pasture areas on uninfected territory is expected to practically eliminate this disease from among the cattle on the Zone. During the fiscal year the veterinarians of the health department made the following inspections:

	Cattle.	Hogs.	Sheep.	Goats.
For the supply department:				
Quarantine inspections.....	13,934	1,263	.....	.....
Ante and post mortem inspections.....	13,141	798	2	.....
For outside interests:				
Quarantine inspections made at the docks on incoming animals.....	238	4	.....	2
Quarantine inspections on animals transferred over the Panama Railroad (Nov. 1, 1916, to June 30, 1917).....	2,424	1,360

Detailed statistics are shown in Table XXII.

Respectfully submitted.

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Chief Health Officer.

Col. CHESTER HARDING, United States Army,
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TABLE I.—ADMISSIONS, DEATHS, AND NONEFFECTIVE RATES FOR EMPLOYEES.

ABSOLUTE NUMBERS.

	Average number of employees.	Admissions to hospitals.			Deaths.			Noneffective from sickness.	
		Total.	Dis- ease.	External causes.	Total.	Dis- ease.	External causes.	Days treated.	Con- stantly non- effective.
Year 1916-17:									
White.....	4,682	1,529	1,293	236	29	18	11	30,389	83.26
Colored.....	29,316	3,294	2,298	996	168	133	35	78,929	216.24
Total.....	33,998	4,823	3,591	1,232	197	151	46	109,318	299.50
Year 1915-16:									
White.....	4,592	1,620	1,356	264	21	15	6	31,719	86.90
Colored.....	28,956	3,908	2,867	1,041	202	152	50	91,633	251.05
Total.....	33,548	5,528	4,223	1,305	223	167	56	123,352	337.95

PROPORTIONATE NUMBERS.

Year 1916-17:									
White.....	4,682	326.57	276.16	50.41	6.19	3.84	2.35	.....	17.78
Colored.....	29,316	112.36	78.39	33.97	5.73	4.54	1.19	.....	7.78
Total.....	33,998	141.86	105.62	36.24	5.79	4.44	1.35	.....	8.81
Year 1915-16:									
White.....	4,592	352.71	295.23	57.48	4.57	3.26	1.31	.....	18.92
Colored.....	28,956	134.96	99.01	35.90	6.98	5.25	1.73	.....	8.67
Total.....	33,548	164.78	125.88	38.90	6.65	4.98	1.67	.....	10.08

TABLE I-A.—DEATHS IN THE CANAL ZONE AND THE CITIES OF PANAMA AND COLON.

	Average population.	Deaths.			Annual average per 1,000.		
		Total.	Disease.	External causes.	Total.	Disease.	External causes.
Year 1916-17:							
Panama.....	60,778	1,766	1,700	66	29.06	27.97	1.09
Colon.....	24,693	639	606	33	25.88	24.54	1.34
Canal Zone.....	31,048	328	278	50	10.56	8.95	1.61
Total.....	116,519	2,733	2,584	149	23.46	22.18	1.28
Year 1915-16:							
Panama.....	60,576	1,710	1,652	58	28.23	27.27	.96
Colon.....	27,012	691	662	29	25.58	24.51	1.07
Canal Zone.....	31,384	398	346	52	12.68	11.02	1.66
Total.....	118,972	2,799	2,660	139	23.53	22.36	1.17

TABLE II.—CAUSES OF DEATHS OF INFANTS BY SEX, COLOR, AGE, AND PLACE OF RESIDENCE.

Cause of death.	Sex.		Color.		-1 wk. -1 mo.	Age by months.												Place of residence.		
	M.	F.	W.	B.		1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	Pan-ama.	Colon.	Canal Zone.	Total.
<i>General diseases.</i>																				
Malarial fever, estivo-autumnal.....	1	1		2										2			1			2
Smallpox.....	1	1		1																1
Whooping cough.....	2	4		6										2			2			6
Diphtheria and croup.....	1	1		2			1	1									2			2
Croup.....	1			1														1		1
Erysipelas.....	1			1							1									1
Pyæmia.....	1			1																1
Tetanus.....	4	1	1	4		1					1						5			1
Pellagra.....	1			1																1
Beriberi.....	6	3		9		1		2	1		1		1		1		3			1
Tuberculosis of the lungs.....	3	4		7					3			1	1		2		5		6	9
Acute miliary tuberculosis.....	3	2		5				1												5
Tuberculous meningitis.....	5	1	1	5			1		2	1		1					6		6	4
Disseminated tuberculosis.....	2	2		4				1								3				4
Syphilis, hereditary.....	9	4	1	12		5	2	2	1								11	2		13
Scurvy.....	1			1		1					1									1
Other general diseases.....	2		2			1									1		2			2
<i>Diseases of the nervous system and of the organs of special sense.</i>																				
Simple meningitis.....																				
Cerebro-spinal fever.....																				
Pneumococcus meningitis.....	2	1	1	2		1		1	1								1			2
Pneumococcus meningitis.....	2	2	2	2					1		1	1					3			3
Meningeal hemorrhage.....	1			1																1
Epilepsy.....	1	1	1														1			2
Convulsions of infants.....	6	1		7													4			1
Convulsions of infants.....	6	1		7													4			1
Acute otitis media.....	1			1													1			1
<i>Diseases of the circulatory system.</i>																				
Acute endocarditis.....	1	1		2		1												1	1	2
Organic diseases of the heart.....	3	1		4		1	2		1								4			5
Organic diseases of the heart.....	3	1		4		1	2		1								4			5
Diseases of the lymphatic system.....	4	1	1			1		2	1								5			5

TABLE II.—CAUSES OF DEATHS OF INFANTS BY SEX, COLOR, AGE, AND PLACE OF RESIDENCE—Continued.

Cause of death.	Sex.		Color.		-1 wk.	+1 wk. -1 mo.	Age by months.												Place of residence.		
	M.	F.	W.	B.			1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	Pan-ama.	Colon.	Canal Zone.	Total.
<i>Diseases of the respiratory system.</i>																					
Acute bronchitis.....	28	27	3	52	.....	4	2	12	9	5	2	6	3	6	2	2	35	18	2	55
Chronic bronchitis.....	13	10	2	23	.....	.....	1	2	2	3	3	2	5	3	1	3	5	17	1	23
Broncho-pneumonia.....	77	69	11	135	2	3	14	20	17	10	14	12	6	16	9	11	77	52	17	146	
Lobar pneumonia.....	4	7	4	7	.....	.....	1	2	1	.....	.....	.....	.....	.....	1	5	10	1	.....	11
Pneumonia, unqualified.....	10	6	4	12	.....	.....	4	1	1	4	.....	.....	3	1	1	1	16	.....	.....	16
Pulmonary congestion.....	1	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
<i>Diseases of the digestive system.</i>																					
Acute stomatitis.....	3	3	.....	3	.....	1	.....	1	1	.....	.....	.....	.....	.....	.....	1	.....	2	1	3
Other diseases of the stomach.....	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
Acute gastritis.....	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Chronic gastritis.....	1	1	.....	2	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	2	.....	2
Acute indigestion.....	163	112	27	248	9	11	24	42	26	26	27	20	13	21	26	13	215	45	15	275	
Diarrhea and enteritis.....	25	22	2	45	.....	3	3	6	5	4	1	5	2	6	5	7	43	1	3	47
Colitis.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Appendicitis and typhlitis.....	5	4	.....	9	.....	2	3	3	1	.....	.....	.....	.....	.....	1	1	7	1	1	9
Intestinal obstructions.....	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1	.....	.....	1
Congestion of liver.....	1	2	.....	3	1	1	.....	1	.....	.....	.....	.....	1	.....	.....	.....	2	1	.....	3
Peritonitis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>Nonvenereal diseases of the genito-urinary system and anæra.</i>																					
Acute nephritis.....	4	4	.....	8	.....	.....	2	.....	.....	.....	2	1	.....	.....	2	.....	5	2	1	8
Chronic nephritis.....	2	1	.....	3	.....	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	1	1	1	3
Other diseases of the kidney and annexa.....	1	2	2	1	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....	1	1	2	3
Pyelonephrosis.....	3	1	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	3	1	.....	4
Retention of urine.....	1	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
<i>Malformations.</i>																					
Congenital malformations (excluding stillbirths).....	6	6	1	11	3	4	1	2	.....	.....	.....	.....	.....	.....	.....	1	9	1	2	12

Diseases of early infancy.

[illegible]

TABLE III.—DEATHS AMONG CHILDREN UNDER 1 YEAR OF AGE, IN THE CANAL ZONE AND THE CITIES OF PANAMA AND COLON, BY CAUSE AND MONTH OF DEATH, JULY, 1916, TO JUNE, 1917.

Cause of death.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
<i>General diseases.</i>													
Malarial fever, estivo-autumnal.....							1				1		2
Smallpox.....						1		1		1	1		1
Whooping cough.....	1		1										2
Diphtheria and croup.....							1	1					1
Croup.....							1						1
Erysipelas.....									1				1
Pyemia.....												1	1
Tetanus.....					1			1			1	2	5
Pellagra.....	1												1
Beriberi.....	1	1		2	1	2	2						9
Tuberculosis of the lungs.....			4		1				1	1			7
Acute miliary tuberculosis.....		2	1	1				1					5
Tuberculous meningitis.....		1	1	2					1		1		6
Disseminated tuberculosis.....			1						3				4
Syphilis, hereditary.....			2			1			1		7	2	13
Scurvy.....			1				1						1
Other general diseases.....							1				1		2
<i>Diseases of the nervous system and of the organs of special sense.</i>													
Simple meningitis.....	1								1				2
Cerebrospinal fever.....				1					2				3
Pneumococcus meningitis.....	1			2				1					4
Meningeal hemorrhage.....			1										1
Epilepsy.....						1				1			2
Convulsions of infants.....			2		2		1		1		1		7
Acute otitis media.....									1				1
<i>Diseases of the circulatory system.</i>													
Acute endocarditis.....			1						1				2
Organic diseases of the heart.....							1	1					3
Diseases of the lymphatic system.....	1	1	1		1			1					5
<i>Diseases of the respiratory system.</i>													
Acute bronchitis.....	4	6	6	1	3	1	6	4	7	5	7	5	55
Chronic bronchitis.....	1	1						3	2	2	3	3	23
Broncho-pneumonia.....	12	11	11	7	11	12	6	5	19	23	14	15	146
Lobar pneumonia.....				3		1	1	1	1		3	1	11
Pneumonia, unqualified.....	1		2	3	1	2	2	1	1			3	16
Pulmonary congestion.....									1				1
<i>Diseases of the digestive system.</i>													
Acute stomatitis.....			3										3
Other diseases of the stomach.....									1				1
Acute gastritis.....											1		1
Chronic gastritis.....								2					2
Acute indigestion.....						1				1			2
Diarrhea and enteritis.....	20	12	13	17	19	31	34	32	28	25	23	21	275
Colitis.....	6	1	3	4	2	13	4	7	3		1	3	47
Appendicitis and typhlitis.....											1		1
Intestinal obstructions.....	4									2	3		9
Congestion of liver.....								1					1
Peritonitis.....	2			1									3
Tumor of liver.....									1				1
<i>Nonvenereal diseases of the genito-urinary system and annexa.</i>													
Acute nephritis.....			2		1					1	2	2	8
Chronic nephritis.....				2							1		3
Other diseases of the kidney and annexa.....	1						2						3
Pyelonephrosis.....					1			1		1		1	4
Retention of urine.....									1				1
<i>Malformations.</i>													
Congenital malformations (excluding stillbirths).....			2		1	1	2	2			1	3	12

TABLE III.—DEATHS AMONG CHILDREN UNDER 1 YEAR OF AGE, IN THE CANAL ZONE AND THE CITIES OF PANAMA AND COLON, BY CAUSE AND MONTH OF DEATH, JULY, 1916, TO JUNE, 1917—Continued.

Cause of Death.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
<i>Diseases of early infancy.</i>													
Newborn child.....					1								1
Congenital debility, icterus and sclerema.....	4			1	1	2		2		1			11
Premature birth.....	5	5	5	9	6	2	6	4	6	3	5	6	69
Congenital debility.....	2	4	5		4	2	3	1	1	2	2	3	29
Atrophy of infants.....													1
Malnutrition.....	2	5	5	3	3	2	3	6	4	2	2	5	54
Other causes peculiar to early infancy.....	3	6		7	3	3	4	1	2	6	2	7	44
Lack of care.....	1					3			1		1	1	4
<i>External causes.</i>													
Traumatism by fall.....										1			1
Homicide by other means.....			1										1
<i>Ill-defined diseases.</i>													
Cause of death not specified or ill defined.....					1		1	1	2	3	1		9
Total.....	75	57	73	66	64	98	82	81	95	81	93	85	950

TABLE IV.—DEATHS BY NATIONALITY.

Nations.	Em- ployees.	Nonem- ployees.	Total.	Nations.	Em- ployees.	Nonem- ployees.	Total.
Antigua.....	3	30	33	Liberia.....		1	1
Antilles.....		3	3	Martinique.....	8	61	69
Argentina.....		1	1	Mexico.....		3	3
Austria.....		2	2	Montserrat.....	5	12	17
Barbados.....	53	391	444	Nassau.....		5	5
Chile.....	2	1	3	Nevis.....	1	1	2
China.....		59	59	Nicaragua.....		3	3
Colombia.....	6	146	152	Norway.....		1	1
Costa Rica.....	3	6	9	Panama.....	7	758	765
Cuba.....	1	4	5	Peru.....		16	16
Curacao.....		4	4	Philippines.....		1	1
Demerara.....	1	8	9	Porto Rico.....		2	2
Dominica.....	1	2	3	Portugal.....		3	3
Ecuador.....		8	8	Russia.....	1	1	1
England.....		7	7	St. Kitts.....	1	2	3
Fortune Island.....	2	1	3	St. Lucia.....	5	54	59
France.....		9	9	St. Thomas.....		6	6
French Guiana.....		1	1	St. Vincent.....	2	12	14
Germany.....		1	1	Salvador.....	1		1
Greece.....	1	9	10	Spain.....	1	34	35
Grenada.....	2	44	46	Tobago.....		1	1
Guadeloupe.....	2	16	18	Trinidad.....	4	23	27
Guatemala.....		2	2	Turkey.....		1	1
Guiana, British.....	1	1	2	United States.....	18	59	77
Haiti.....	2	4	6	Venezuela.....	1	9	10
Holland.....		2	2	West Indies.....		1	1
India.....		5	5	Unknown.....	4	14	18
Italy.....	1	24	25				
Jamaica.....	58	659	717	Total.....	197	2,536	2,733
Japan.....		2	2				

[illegible]

1 One 13 years old.

TABLE VI.—DEATH RATES AMONG AMERICANS ON THE ISTHMUS.

	Annual average per 1,000.
White employees from the United States:	
Disease.....	2.60
External causes.....	2.13
Total.....	4.73
White women and children from the United States:	
Disease.....	3.31
External causes.....	.47
Total.....	3.78
White employees and their families from the United States:	
Disease.....	2.99
External causes.....	1.32
Total.....	4.31
Total Americans on the Canal Zone: ¹	
Disease.....	1.81
External causes.....	1.56
Total.....	3.37

¹ Total number of Americans on the Canal Zone includes employees and their families and the officers and enlisted men of the United States Army stationed on the Isthmus.

TABLE VII.—CAUSES OF DEATHS OF CIVIL POPULATION (EMPLOYEES AND NONEMPLOYEES) AND MILITARY, BY SEX, COLOR, AGE, AND PLACE OF RESIDENCE.

Cause of death.	Sex.		Color.		Age (in years).								Place of residence.						
	Male.	Fe- male.	White.	Black.	Yel- low.	1	1-4	5-10	11-20	21-30	31-40	41-50	51-60	61-75	76-100	Pana- ma.	Colon.	Canal Zone.	Total.
						year.	year.	year.	year.	year.	year.	year.	year.	year.	year.				
General diseases.																			
Typhoid fever.....	4	2			6	2	2		2	1	1	1	1			2		4	6
Malarial fever, estivo-autumnal.....	9	7	5	11		1	1		1	3	4	1				3	3	10	16
Smallpox.....	1	1		1		1										1			1
Measles.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Whooping cough.....	2	5		7		6	1		1							7		1	7
Diphtheria and croup.....	5	3	3	4	1	2	2	3					1			5	2	1	8
Croup.....	1	.....	.....	4	.....	1										1			1
Dysentery.....	2	2		2		1			1		1			1		4			4
Dysentery, enteric.....	2	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
Dysentery, bacillary.....	1	.....	1	.....	.....	.....	.....	.....	1	1						1			1
Dysentery, unclassified.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leprosy.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	1					1			1
Erysipelas.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Purulent infection and septicaemia.....	1	.....	5	.....	.....	.....	.....	.....	1	2	.....	3	.....	.....	.....	1	.....	.....	1
Pyemia.....	6	1	.....	7	.....	1	.....	.....	.....	3	1	1	1	.....	.....	4	1	1	6
Septicemia.....	2	2	.....	4	.....	.....	.....	.....	.....	2	1	.....	.....	.....	.....	3	2	3	7
Pyemia and septicaemia, pneumococcus.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	1
Tetanus.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pellagra.....	11	31	2	40	.....	5	.....	.....	.....	1	10	4	1	1	.....	19	19	4	42
Beriberi.....	14	5	2	16	1	9	.....	.....	.....	1	.....	4	.....	.....	.....	13	.....	.....	19
Tuberculosis of the lungs.....	218	140	28	369	21	7	12	7	30	136	87	42	24	11	2	253	85	20	358
Acute military tuberculosis.....	13	5	1	17	.....	5	4	.....	2	6	1	.....	.....	.....	.....	11	3	1	18
Tuberculous meningitis.....	11	5	5	11	.....	6	7	1	2	.....	.....	.....	.....	.....	.....	13	1	2	16
Abdominal tuberculosis.....	1	2	.....	3	.....	.....	.....	.....	.....	1	1	1	.....	.....	.....	3	.....	.....	3
Tuberculosis of bones and joints.....	1	1	.....	2	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
Tuberculosis of other organs.....	2	.....	.....	2	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	1	1	.....	2
Tuberculosis of the genito-urinary organs.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Disseminated tuberculosis.....	35	17	5	47	.....	4	10	.....	2	19	10	6	1	.....	.....	30	10	12	52
Syphilis, tertiary.....	9	9	.....	18	.....	.....	.....	.....	.....	3	6	5	3	1	.....	11	5	2	18
Syphilis, hereditary.....	11	4	1	14	.....	13	2	.....	.....	.....	.....	.....	.....	.....	.....	13	2	.....	15
Syphilis, period not stated.....	2	2	2	2	.....	.....	.....	.....	.....	2	1	1	.....	.....	.....	3	1	.....	4
Cancer and other malignant tumors of the buccal cavity.....	4	1	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	1	5
Cancer and other malignant tumors of the stomach and liver.....	7	6	4	9	.....	.....	.....	.....	.....	.....	3	3	4	3	.....	6	4	3	13
Cancer and other malignant tumors of the peritoneum, intestines, rectum.....	2	3	.....	5	.....	.....	.....	.....	.....	1	1	2	.....	1	.....	3	1	1	5

TABLE VII.—CAUSES OF DEATHS OF CIVIL POPULATION (EMPLOYEES AND NONEMPLOYEES) AND MILITARY, BY SEX, COLOR, AGE, AND PLACE OF RESIDENCE—Continued.

Cause of death.	Sex.		Color.			Age (in years).								Place of residence.				Total.	
	Male.	Fe- male.	White.	Black.	Yel- low.	1 year.	1-4	5-10	11-20	21-30	31-40	41-50	51-60	61-75	76-100	Pana- ma.	Colon.		Canal Zonc.
<i>General diseases—Continued.</i>																			
Cancer and other malignant tumors of the female genital organs.....		10	3	7							1	3	4	2		9		1	10
Cancer and other malignant tumors of the breast.....		3		3							2	1				2		1	3
Cancer and other malignant tumors of other organs not specified.....	8	2	3	6	1					2	2	4	1		1	4	4	2	10
Acute articular rheumatism.....	2	1		3					1		2					3			3
Scurvy.....	1	1		1		1										2			2
Diabetes.....	2	2	1	3						1	1					2	1		4
Hodgkin's disease.....	2			2						1	1						1	1	2
Anemia, chlorosis.....		1		1						1						1			1
Anemia, secondary, cause not determined.....	3			3						1	2					2	1	1	3
Other general diseases.....	3		2	1		2				1			2			2	2	1	3
Alcoholism (acute or chronic).....	3	1	1	3						2	1		1			4	1		4
Alcoholism, acute.....	5		2	3						2	3								5
Alcoholism, chronic.....	1	3	1	3					1	1	1					3		1	4
<i>Diseases of the nervous system and of the organs of special sense.</i>																			
Encephalitis.....	1			1							1							1	1
Simple meningitis.....	4	6	2	8		3	4	1			1	1				7	1	2	10
Cerebrospinal fever.....	2	1	2	1		2			1							2			3
Pneumococcus meningitis.....	3	2	2	3		4							1			3			5
Locomotor ataxia.....	3		2	1									1						3
Other diseases of the spinal cord.....	2	1	2	1					1	1			1						3
Cerebral hemorrhage, apoplexy.....	22	24	8	38		1		1	1	7	11	7	12	5	2	22	19	5	46
Softening of the brain.....	4	1		5						2	1	1	1		1	2	1		5
Paralysis without specified cause.....	4	1	1	3						3		1	1			3	1		4
Paralysis without specified cause.....	4	1	1	5						3	2	1	1			4		2	6
General paralysis of the insane.....	6		1	1													1		1
Other forms of mental alienation.....									3	2	2	1					7	4	2
Epilepsy.....	5	8	1	12		2	3									5	5	3	13
Convulsions of infants (under 5 years of age).....	10	3	3			1	7	6											13
Neuritis.....	1			1															1
Other diseases of the nervous system.....	1	3	1	3						1	2		1			2	1	1	4
Tumor of the brain.....	1		1																1
Diseases of the ears.....	1			1		1										1			1

Diseases of the circulatory system.

Pericarditis.....	6	3	1	8	1	2	4	1	1	7	2	2	9
Acute endocarditis.....	9	5	2	11	2	3	3	2	2	9	3	2	14
Malignant endocarditis.....	3	2	2	2	1	3	1	2	1	1	1	1	4
Organic diseases of the heart.....	75	34	7	100	2	21	18	24	13	65	32	12	109
Angina pectoris.....	1	2	3	3	3	1	1	1	1	2	1	1	3
Diseases of the arteries, aneurism, etc.....	2	1	3	3	2	2	1	1	1	2	2	2	3
Aneurysm.....	9	4	1	12	3	2	6	2	1	7	4	2	13
Arteriosclerosis.....	20	7	3	22	2	2	4	2	10	21	3	3	27
Embolism and thrombosis.....	2	4	2	4	2	2	2	1	5	2	2	2	6
Diseases of the lymphatic system.....	4	1	1	4	5	1	1	1	1	5	2	2	5
Hemorrhage; other diseases of the circulatory system.....	3	1	1	3	2	1	1	1	1	2	2	2	4

<i>Diseases of the respiratory system.</i>													
Diseases of the nasal fossæ.....	1			1						1			1
Diseases of the thyroid body.....													1
Acute bronchitis.....	36	37	6	63	4	55	15	2		47	24	2	73
Chronic bronchitis.....	19	14		33	23	7	1	1		7	25	1	33
Broncho-pneumonia.....	127	118	26	217	2	146	75	5	3	148	75	22	245
Pneumonia (unqualified).....	22	18	6	34	16	14			1	35	3	2	40
Lobar pneumonia.....	76	34	16	94	11	9	2	7	24	65	26	19	110
Pleurisy.....	1			1					1	1			1
Empyema.....	1	3	1	3					1	1	2	1	4
Pulmonary congestion.....	4	1		2	1	1			3	3	2		5
Gangrene of the lungs.....	2	2		4					4	4			4
Asthma.....	1	5		6		1			1	5	1		6
Other diseases of the respiratory system.....	1			1						1			1
Abscess of the lungs.....	4	2	1	5		1	1	2		2	3	1	6

<i>Diseases of the digestive system.</i>													
Diseases of the mouth and anuxa.....	2			2		2					2		2
Diseases of the teeth and gums.....	1	1		1	1	1			1	1			1
Stomatitis.....	1	1											1
Diseases of the esophagus.....	1	1		1	1	1				1			1
Other diseases of the stomach (cancer excepted).....	1	3	2	2	1	1			1	3			4
Acute gastritis.....	1	1		1						1			1
Chronic gastritis.....	1	2		3	2	1			1	1			3
Acute indigestion.....	2	1		3	2	1				2			3
Diarrhea and enteritis.....	200	138	28	307	3	275	63			268	53	17	338
Colitis.....	31	30	3	58	47	14				57	1	3	61
Diarrhea and enteritis (2 years and over).....	2	4	6	6	2	1				3	3		6
Colitis.....	4	3		3	1				1	5	2		7
Ankylostomiasis.....	2	1		3					1	2			3
Intestinal parasites.....	1			1		1							1
Appendicitis and typhilitis.....													1
Acute appendicitis.....	2	1	1	2	1	1				1			2
Chronic appendicitis.....	1												1
Hernia, intestinal obstructions.....	2	2		4	1	1		2		3	1		4
Other hernias.....	1			1									1
Intestinal obstruction.....	8	7	1	14	9			1		14	1		15
Other diseases of the intestines.....	2		1	1				1		1			2
Constipation.....	2	1		1		1		1		1			1

TABLE VII.—CAUSES OF DEATHS OF CIVIL POPULATION (EMPLOYEES AND NONEMPLOYEES) AND MILITARY, BY SEX, COLOR, AGE, AND PLACE OF RESIDENCE—Continued.

Cause of death.	Sex.		Color.		Age (in years).								Place of residence.						
	Male.	Fe- male.	White.	Black.	Yel- low.	1 year.	1-4	5-10	11-20	21-30	31-40	41-50	51-60	61-75	76-100	Pan- ma.	Colon.	Canal Zone.	Total.
<i>Diseases of the digestive system—Continued.</i>																			
Duodenal ulcer.....	2	1		3							1		2			3			3
Acute yellow atrophy of the liver.....	1			1												1			1
Cirrhosis of the liver.....	7	7		13	1					4	2	4	2	1	1	10	3	1	14
Other diseases of the liver.....	5	1		6		1	1		1							4	2		6
Abscess of liver (unqualified).....	5	2	1	6						3		3	1			6	1		7
Cholecystitis.....	1			1							1					1			1
Diseases of the spleen.....	1			1						1						1			1
Simple peritonitis (nonpuerperal).....	9	11		19	1	3			4	4	6	1	1	1		10	8	2	20
Other diseases of the digestive system.....	3		2	1						1	1	1				2		1	3
<i>Nonvenereal diseases of the genito-urinary system.</i>																			
Acute nephritis.....	27	16	4	38	1	8	4	1	1	16	9	3	1			35	7	1	43
Bright's disease (chronic nephritis).....	90	48	20	113	5	3	5	1	4	25	35	22	26	14	3	67	54	17	138
Other diseases of the kidney and annexa.....	11	5	5	11		3				4	3	1	3	2		9	4	3	16
Pyelonephrosis.....	5	3	1	7		4	3						1			4	2	2	8
Diseases of the bladder.....	1			1		1										1			1
Diseases of the urethra, urinary abscess, etc.....	4			4							1	3				2		2	4
Stricture of the urethra, nonvenereal.....			2							1		1		2		2		1	3
Uterine hemorrhage (nonpuerperal).....	3			2						1						1			2
Other diseases of the uterus.....		1		1						1	1					1	1		1
Cysts and other tumors of the ovary.....		2		2								1				1			1
Salpingitis and other diseases of the female genital organs.....		2		2						1	1					1	1		2
<i>The puerperal state.</i>																			
Accidents of pregnancy.....		1			1					1							1		1
Extra-uterine pregnancy.....		1		1							1						1		1
Abortion.....		1		1						1						1			1
Puerperal hemorrhage.....		6		6						2	4					6			6
Other accidents of labor.....		2		2						1	1					2			2
Puerperal septicemia.....		5	1	4						3	2					3	5	3	5
Eclampsia.....		10	2	8					1	6	3					2		2	10
Puerperal insanity.....		1	1													1			1
<i>Diseases of the skin and of the cellular tissue.</i>																			
Gangrene.....	1	1		2									2			1		1	2
Peniphigus contagiosus.....				1												1			1
Other diseases of the skin and annexa.....	1	1		1		1	1		1							1			1

Cause of death.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
<i>General diseases.</i>													
Typhoid fever.....	1	1	1	1	1	1	1	1	1	1	1	1	6
Malarial fever, estivo-autumnal.....	6	1	1	3	1	1	1	1	2	1	1	1	16
Smallpox.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Measles.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Whooping cough.....	1	4	1	1	1	1	1	1	1	1	1	2	8
Diphtheria and croup.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Croup.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Dysentery.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Dysentery, entamebic.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Dysentery, bacillary.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Dysentery, unclassified.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Leprosy.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Erysipelas.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Purulent infection and septicemia.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Pyæmia.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Septicæmia.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Pyæmia and septicæmia, pneumococcie.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Tetanus.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Pellagra.....	3	6	7	1	7	5	2	2	2	2	3	2	42
Beriberi.....	2	1	3	3	2	2	1	1	1	4	1	2	19
Tuberculosis of the lungs.....	25	27	29	35	30	31	40	25	32	20	24	40	358
Acute miliary tuberculosis.....	1	3	1	2	1	3	3	3	1	3	1	1	18
Tuberculous meningitis.....	1	1	1	2	1	1	3	2	2	1	1	1	16
Abdominal tuberculosis.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Tuberculosis of the bones and joints.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Tuberculosis of other organs.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Tuberculosis of the genito-urinary organs.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Disseminated tubercleculosis.....	9	7	8	2	3	2	2	2	7	1	6	3	52
Syphilis, tertiary.....	2	1	1	2	2	2	2	1	2	2	2	3	18
Syphilis, hereditary.....	1	1	1	1	7	2	1	1	2	1	1	1	15
Syphilis, period not stated.....	1	1	1	1	1	1	1	1	1	1	1	1	4
Cancer and other malignant tumors of the buccal cavity.....	1	1	1	1	1	1	1	1	1	1	1	1	5
Cancer and other malignant tumors of the stomach and liver.....	2	2	1	1	1	1	1	1	1	1	2	2	13
Cancer and other malignant tumors of the peritoneum, rectum, etc.....	1	1	1	1	1	1	1	1	1	1	1	1	5
Cancer and other malignant tumors of the female genital organs.....	1	1	1	1	3	1	1	1	1	1	2	2	10
Cancer and other malignant tumors of the breast.....	1	1	1	1	1	1	1	1	1	1	1	1	3
Cancer and other malignant tumors of other organs.....	1	2	2	2	2	1	1	1	1	1	1	1	10
Acute articular rheumatism.....	1	1	1	1	1	1	1	1	1	1	1	1	3
Scurvy.....	1	1	1	1	1	1	1	1	1	1	1	1	2
Diabetes.....	1	1	1	1	1	1	1	1	1	1	1	1	4
Hodgkin's disease.....	1	1	1	1	1	1	1	1	1	1	1	1	2
Anæmia, chlorosis.....	1	1	1	1	1	1	1	1	1	1	1	1	3
Anæmia, secondary, cause not determined.....	1	1	1	1	1	1	1	1	1	1	1	1	3
Other general diseases.....	1	1	1	1	1	1	1	1	1	1	1	1	3
Alcoholism (acute or chronic).....	2	1	1	1	1	1	1	1	1	1	1	1	4
Alcoholism, chronic.....	1	1	1	1	1	1	1	1	1	1	1	1	4
Alcoholism, acute.....	1	1	2	1	1	1	1	1	1	1	1	1	5
<i>Diseases of the nervous system and of the organs of special sense.</i>													
Encephalitis.....	1	1	1	1	1	1	2	2	1	1	1	1	1
Simple meningitis.....	2	1	1	1	1	1	2	2	1	1	1	1	10
Cerebrospinal fever.....	1	1	1	1	1	1	1	1	1	1	1	1	3
Pneumococcus meningitis.....	1	1	1	1	1	1	1	1	1	2	1	1	5
Locomotor ataxia.....	1	1	1	1	1	2	1	1	1	1	1	1	3
Other diseases of the spinal cord.....	1	1	1	1	1	1	1	1	1	1	1	1	3
Cerebral hemorrhage, apoplexy.....	2	3	3	4	2	3	4	7	5	2	5	6	46
Softening of the brain.....	1	1	1	1	1	1	1	1	1	1	1	1	5
Paralysis without specified cause.....	1	1	1	1	1	1	1	1	1	1	1	1	6
General paralysis of the insane.....	1	1	1	1	1	1	1	1	1	1	1	1	4
Other forms of mental alienation.....	1	1	1	1	1	1	1	1	1	1	1	1	4
Epilepsy.....	2	2	1	3	2	1	1	1	1	1	2	2	13
Convulsions of infants (under 5 years of age).....	2	2	1	2	2	1	1	1	2	1	2	1	13
Neuritis.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Other diseases of the nervous system.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Tumor of the brain.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Diseases of the ears.....	1	1	1	1	1	1	1	1	1	1	1	1	1

TABLE VIII.—DEATHS AMONG CIVIL POPULATION, ETC.—Continued.

Cause of death.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
<i>Diseases of the circulatory system.</i>													
Pericarditis.....	1	...	1	...	2	1	2	...	1	1	...	...	9
Acute endocarditis.....	1	1	2	2	1	...	1	1	1	1	2	2	14
Malignant endocarditis.....	...	...	1	...	...	...	1	...	1	...	1	...	4
Organic diseases of the heart.....	9	12	11	15	12	7	6	4	5	7	11	10	109
Angina pectoris.....	...	...	...	...	...	...	1	...	1	...	1	...	3
Diseases of the arteries, atheroma, aneurysm, etc.....	1	2	2	1	1	...	1	...	...	...	1	2	13
Aneurysm.....	3	1	1	1	6	2	4	4	1	1	3	...	27
Arteriosclerosis.....	2	1	1	1	...	...	1	1	...	...	1	...	6
Embolism and thrombosis.....	...	1	...	...	...	...	1	1	...	...	1	...	5
Diseases of the lymphatic system.....	...	...	...	...	...	...	...	...	...	...	...	...	...
Hemorrhage; other diseases of the circulatory system.....	...	...	...	1	...	...	...	1	1	...	...	1	4
<i>Diseases of the respiratory system.</i>													
Diseases of the nasal fossae.....	...	...	...	...	...	...	...	...	...	1	...	...	1
Laryngitis.....	...	...	...	...	...	...	...	...	...	1	...	...	1
Diseases of the thyroid body.....	...	...	...	...	...	...	...	...	...	...	...	1	1
Acute bronchitis.....	7	6	8	5	9	8	5	7	7	3	4	4	73
Chronic bronchitis.....	...	3	2	2	4	7	1	2	...	...	1	9	33
Broncho-pneumonia.....	12	14	34	34	25	23	28	14	13	15	16	17	245
Pneumonia (unqualified).....	4	4	4	3	...	4	3	1	2	4	7	4	40
Lobar pneumonia.....	6	5	11	7	10	10	8	12	14	12	5	...	110
Pleurisy.....	...	...	...	1	...	...	...	...	...	...	...	...	1
Empyema.....	1	...	1	1	...	...	1	...	...	1	...	...	4
Pulmonary congestion, pulmonary apoplexy.....	1	3	1	...	...	...	...	...	...	...	...	...	5
Gangrene of the lungs.....	1	...	...	...	...	...	1	2	...	...	...	...	4
Asthma.....	1	1	...	1	...	...	1	...	1	...	...	1	6
Other diseases of the respiratory system.....	...	...	...	...	1	...	...	...	...	...	...	...	1
Abscess of lungs.....	...	...	1	...	...	...	2	2	...	...	...	1	6
<i>Diseases of the digestive system.</i>													
Diseases of the mouth and annæxa.....	...	...	...	...	...	...	...	...	2	...	...	...	2
Diseases of the teeth and gums.....	...	...	...	...	...	...	...	...	...	...	...	1	1
Stomatitis.....	...	...	...	...	...	...	...	...	1	...	...	...	1
Diseases of the esophagus.....	...	...	1	...	...	...	...	...	...	...	...	...	1
Other diseases of the stomach.....	...	...	1	...	...	...	1	...	...	2	...	...	4
Acute gastritis.....	...	...	...	...	1	...	...	...	...	...	...	...	1
Chronic gastritis.....	...	2	...	...	...	...	...	...	1	...	...	...	3
Acute indigestion.....	...	...	...	1	...	...	...	...	...	1	...	1	3
Diarrhea and enteritis.....	47	41	33	28	28	24	28	16	16	20	21	36	338
Colitis.....	7	7	3	2	2	4	6	2	3	6	2	17	61
Diarrhea and enteritis (2 years and over).....	...	1	2	...	...	1	...	1	...	...	1	...	6
Colitis.....	...	...	1	1	...	...	1	1	...	...	3	...	7
Intestinal parasites.....	...	1	...	...	...	...	...	...	...	...	...	...	1
Appendicitis and typhlitis.....	...	...	...	...	1	...	...	...	...	...	...	...	1
Acute appendicitis.....	...	1	...	...	...	1	...	...	...	...	...	...	2
Chronic appendicitis.....	1	...	...	...	...	...	...	...	...	...	...	...	1
Ankylostomiasis.....	...	...	...	1	...	...	1	1	...	...	...	...	3
Hernia, intestinal obstructions.....	...	...	...	2	1	...	...	...	...	...	...	1	4
Other hernias.....	...	...	...	...	...	...	...	...	...	...	...	1	1
Intestinal obstruction.....	...	...	1	1	3	2	3	2	1	...	1	1	15
Other diseases of the intestines.....	...	...	1	...	...	...	...	...	...	1	...	...	2
Constipation.....	...	...	...	...	...	...	...	...	...	...	1	...	1
Duodenal ulcer.....	...	...	...	...	...	2	...	...	...	...	1	...	3
Acute yellow atrophy of the liver.....	...	...	...	...	...	...	1	...	...	...	...	...	1
Cirrhosis of the liver.....	1	...	1	3	...	1	1	4	1	...	1	1	14
Other diseases of the liver.....	...	1	...	...	...	...	...	...	2	...	2	1	6
Abscess of liver (unqualified).....	3	...	...	1	...	...	...	1	...	1	...	1	7
Cholecystitis.....	...	...	...	1	...	...	...	...	...	...	...	...	1
Diseases of the spleen.....	...	...	...	...	...	...	...	...	...	...	1	...	1
Simple peritonitis.....	2	2	2	3	1	1	2	...	1	4	2	...	20
Other diseases of the digestive system.....	...	1	...	...	...	...	...	1	1	...	...	...	3
<i>Nonvenereal diseases of the genito-urinary system.</i>													
Acute nephritis.....	...	4	4	4	7	8	2	3	6	2	2	1	43
Bright's disease (chronic nephritis).....	3	7	9	17	19	14	13	17	5	11	14	9	138
Other diseases of the kidney and annæxa.....	4	...	2	...	...	1	2	2	3	...	1	1	16
Pyelonephrosis.....	...	1	...	2	1	1	...	...	1	...	2	...	8
Diseases of the bladder.....	...	...	1	...	...	...	...	...	...	...	...	...	1
Diseases of the urethra, urinary abscess.....	2	...	...	...	...	1	...	...	...	...	1	...	4
Stricture of the urethra, nonvenereal.....	1	...	...	2	...	...	...	...	...	...	...	...	3
Uterine hemorrhage (nonpuerperal).....	...	...	...	...	...	...	...	...	...	...	...	1	1
Other diseases of the uterus.....	...	...	...	...	...	...	...	2	...	...	...	...	2
Salpingitis and other diseases of the female genital organs.....	1	1	...	...	...	...	...	...	...	...	...	...	2
Cysts and other tumors of the ovary.....	...	...	...	...	...	...	1	...	...	...	...	...	1

TABLE VIII.—DEATHS AMONG CIVIL POPULATION, ETC.—Continued.

Cause of death.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
<i>The puerperal state.</i>													
Accidents of pregnancy.....									1				1
Extra-uterine pregnancy.....										1			1
Abortion.....		1											1
Puerperal hemorrhage.....	1		1		2					1	1		6
Other accidents of labor.....	1				1								2
Puerperal septicemia.....	1				2		1	1					5
Eclampsia.....		2	2		2	1	1			2			10
Puerperal insanity.....							1						1
<i>Diseases of the skin and of the cellular tissue.</i>													
Gangrene.....					1		1						2
Pemphigus contagious.....				1									1
Other diseases of the skin and annexa.....								1					1
<i>Diseases of the bones and of the organs of locomotion.</i>													
Diseases of the bones (tuberculosis excepted).....			1										1
<i>Malformations.</i>													
Congenital malformations (stillbirths not included).....		2		1	1	3			2	1	1	1	12
<i>Diseases of early infancy.</i>													
Newborn child.....				1			4				1		1
Congenital debility, icterus and sclerema.....	2			3	5	6	6	5	5	8	6	2	10
Premature birth.....	7	6	6	3	5	6	6	5	5	8	6	6	69
Congenital debility.....	3	2	1	2	2	3	2	4	5		3	2	29
Atrophy of infants.....		1				1							2
Malnutrition.....	6	5	5	2	9	6	3	5	6	3	3	9	62
Other causes peculiar to early infancy.....	4	1	2	6	2	7	3	6		7	3	3	44
Lack of care.....			1		1	1	1						4
<i>Old age.</i>													
Senility.....	2	1		2		1					1		7
<i>Affections produced by external causes.</i>													
Suicide by hanging or strangulation.....			1									1	2
Suicide by drowning.....		1			1	1	1				1		2
Suicide by firearms.....	3	2			1	1	1			2	1	1	12
Suicide by cutting or piercing instruments.....					1						1		2
Other suicides.....											1		1
Acute poisonings.....	1			1		1				1	1		4
Conflagration.....	5			1	1								7
Burns (conflagration excepted).....			1			1	1			1	1		5
Absorption of deleterious gases.....									1	1			2
Accidental drowning.....	3	1	7	2	5	4	2	4	3	1	1	2	35
Traumatism by firearms.....	1											1	3
Traumatism by fall.....	1		1	2	1			3	1	2		1	12
Traumatism by machines.....		2				1							3
Traumatism by other crushings.....	3	2		3		3	1	5	2	1			20
Railroad traumatism.....		2		1		1	4		1				7
Injuries by animals.....						1	1						2
Electricity (lightning excepted).....						1				2			3
Homicide by firearms.....		2	4	1	1		1	1	3				13
Homicide by cutting or piercing instruments.....						1		1	1				3
Homicide by other means.....	1		1	1					1				4
Fractures, cause not specified.....	2												2
Other external violence.....		1	1			1					1	1	5
<i>Ill-defined diseases.</i>													
Ill-defined organic diseases.....								1					1
Cause of death not specified, or ill-defined.....	3	4	6	3		1	1		2	2	1	4	27
Infections of undetermined origin.....					1						1		2
Total.....	243	229	261	248	259	236	232	193	196	185	205	246	2,733
Stillbirths.....	33	35	27	30	26	39	27	21	23	28	16	26	331
Grand total.....	276	264	288	278	285	275	259	214	219	213	221	272	3,064

TABLE IX.—DISCHARGES OF EMPLOYEES FROM HOSPITALS, SHOWING CAUSE OF ADMISSION AND MONTH OF DISCHARGE.

Cause of admission.	July. ¹		Au- gust. ¹		Sep- tember. ¹		Octo- ber.		No- ember.		Decem- ber.		Janu- ary.		Febru- ary.		March.		April.		May.		June.		Total.		Grand total.
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	Total.		
<i>General diseases.</i>																											
Typhoid fever.....	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2	1	1	1	1	1	1	14	15	
Relapsing fever.....																									1	1	
Malaria.....	20	76	10	57	3	19	3	16	5	10	4	7	9	12	3	7	7	4	3	6	5	4	6	13	24	33	
Malarial fever, estivo-autumnal.....	4	8	4	5		1	4	3	4	1	3	4	1	5	2	6	3	4	1	4	4	2	5	3	32	46	
Malarial fever, tertian.....																									3	3	
Malarial fever, quartan.....		1																							2	2	
Malarial fever, undetermined.....																									2	2	
Malarial fever, clinical.....	2	3				1	2																		2	2	
Varicoid.....																									7	9	
Measles.....			2	2																					2	2	
Diphtheria and croup.....		2	1	1		1	1				1	2													1	8	
Croup.....		1																							2	2	
Influenza.....	2	1	4	1	3	12	2	4	6	2	2	9	4	6	5	6	9	5	6	2	21	14	17	9	95	54	
Cholera nostras.....																									4	1	
Dysentery, enteric.....																									2	2	
Dysentery, unclassified.....	1											1													4	4	
Leprosy.....																									5	5	
Erysipelas.....			1																						2	2	
Dengue.....																									2	2	
Chicken pox.....		2	4	5	1	5	1	5	6	1	6	9	1	11	3	3	3	5	3	3	5	2	2	2	61	63	
German measles.....		1																							1	1	
Mumps.....																									2	2	
Yaws.....			1																						1	1	
Filariasis.....																									3	3	
Purulent infection and septicaemia.....	1	1																							2	2	
Pyemia.....																									1	1	
Septicemia.....																									2	2	
Tetanus.....																									1	1	
Pellagra.....																									2	2	
Tuberculosis of the lungs.....			1																						1	1	
Acute military tuberculosis.....	2	5	2	5	4	3	4	3	4	2	2	5	2	4	1	1	2	3	1	1	1	1	1	1	15	48	
Pott's disease.....																									3	3	
Tuberculosis of bones and joints.....																									2	2	
Tuberculosis of other organs.....																									1	1	

¹ Admissions are shown for the months of July, August, and September.

Traumatism by machines.....	1	4	2	1	3	1	2	1	6	....	3	1	1	1	5	1	3	2	4	3	3	....	1	12	37	
Traumatism by other crushings (vehicles, railroads, landslides, etc.).....	1	14	22	1	15	....	19	4	5	1	3	1	10	1	6	4	5	....	7	1	8	1	4	15	118	
Railroad traumatism.....	....	....	1	1	....	....	....	....	1	1	1	1	3	....	....	....	....	....	1	2	1	2	4	12	16	
Dynamite traumatism.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Traumatism by landslides.....	....	....	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Injuries by animals.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Heat exhaustion.....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Electricity (lightning excepted).....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fractures (cause not specified).....	3	2	4	11	3	8	2	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dislocations.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sprains.....	....	....	2	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other external violence.....	9	24	10	18	3	33	8	23	7	31	12	44	5	34	9	45	35	10	42	7	36	6	31	95	396		
<i>Ill-defined diseases.</i>																											
Ill-defined organic disease.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Infections of undetermined origin.....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
No disease.....	2	6	16	....	4	1	3	....	2	1	4	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Total.....	127	292	109	317	100	250	125	232	110	237	125	228	139	262	109	239	131	231	104	267	150	272	144	243	1,473	3,070	
	49	133	118	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	4	12	16	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				

TABLE X.—CONSOLIDATED HOSPITAL REPORT.

	Remain- ing July 1, 1916.		Admitted.		Died.		Discharged.		Trans- ferred.		Remain- ing June 30, 1917.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
ANCON HOSPITAL.												
Panama Canal employees.....	32	118	1,091	2,015	14	64	1,073	1,925	3	23	133	121
Panama Railroad employees.....	9	55	131	578	1	32	130	544	.....	14	9	43
Panama pay patients.....	.....	1	.....	7	.....	2	.....	.....	.....	5	.....	1
Other pay patients.....	134	49	3,817	1,485	36	134	3,737	1,317	22	17	156	66
Charity patients.....	7	35	254	332	2	50	247	254	1	37	11	26
Total.....	182	258	5,293	4,417	53	282	5,187	4,040	26	96	209	257
COROZAL HOSPITAL.												
Panama Canal employees.....	5	10	.....	11	.....	1	1	4	4	9	.....	7
Panama Railroad employees.....	.....	5	.....	7	.....	.....	.....	5	.....	6	.....	1
Panama pay patients.....	33	172	38	90	6	32	15	21	.....	8	50	201
Other pay patients.....	8	1	33	14	1	4	28	7	3	1	9	3
Charity cases.....	9	48	7	44	.....	6	6	10	1	6	9	70
Total.....	55	236	78	166	7	43	50	47	8	30	68	282
Corozal farm: Panama Canal employees.....	10	44	15	47	.....	.....	15	32	1	4	9	55
Chronic ward: Charity patients.....	.....	28	.....	24	.....	.....	.....	11	.....	18	.....	23
COLON HOSPITAL.												
Panama Canal employees.....	7	2	204	321	.....	11	178	246	27	58	6	8
Panama Railroad employees.....	2	11	107	375	.....	15	96	269	11	89	2	13
Panama pay patients.....	1	.....	21	114	4	12	8	26	9	76	1	.....
Other pay patients.....	7	3	438	87	7	6	368	45	55	34	15	5
Charity patients.....	.....	.....	55	34	1	2	47	17	4	15	3	.....
Total.....	17	16	825	931	12	46	697	603	106	272	27	26
PALO SECO LEPROSY ASYLUM.												
Panama Canal employees.....	.....	3	.....	1	.....	.....	.....	.....	.....	4	.....	.....
Panama pay patients.....	2	37	1	5	.....	6	.....	.....	.....	.....	2	36
Charity patients.....	2	21	.....	9	2	3	.....	1	.....	.....	1	26
Total.....	4	61	1	15	2	9	.....	1	.....	4	3	62
GRAND TOTALS.												
Panama Canal employees.....	54	177	1,310	2,395	14	76	1,267	2,207	35	98	43	191
Panama Railroad employees.....	11	71	238	960	1	47	226	818	11	109	11	57
Panama pay patients.....	36	210	50	216	10	52	23	47	9	89	53	238
Other pay patients.....	149	53	4,288	1,586	44	144	4,133	1,369	80	52	180	74
Charity patients.....	18	132	316	443	5	61	290	293	6	76	24	145
Total.....	268	643	6,202	5,600	74	380	5,939	4,734	141	424	316	705

TABLE XI.—CONSOLIDATED REPORT OF EMPLOYEES TREATED IN QUARTERS.

Stations.	Re- main- ing July 1, 1916.		Admitted.		Died.		Discharged.		Trans- ferred.		Re- main- ing June 30, 1917.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
Ancon.....	.....	.....	1,179	33	.....	.....	1,163	29	15	4	1	.....
Balboa.....	3	.....	1,602	124	.....	.....	1,565	75	32	49	8	.....
Pedro Miguel.....	.....	.....	188	9	.....	.....	150	8	7	1	1	.....
Paraiso.....	1	.....	124	75	.....	.....	117	58	7	1	1	.....
Gamboa.....	1	.....	12	18	.....	.....	11	16	2	2	.....	.....
Gatun.....	2	1	155	65	.....	.....	151	60	6	.....	.....	.....
Colon.....	6	17	1,130	1,412	.....	.....	1,129	1,392	.....	.....	7	37
Total.....	13	18	4,360	1,736	.....	.....	4,286	1,648	69	67	18	39

TABLE XI-A.—CONSOLIDATED REPORT OF DAYS LOST IN QUARTERS.

Stations.	White	Colored.	Total.
Ancon.....	2,172	168	2,340
Balboa.....	3,657	359	4,016
Pedro Miguel.....	374	45	419
Paraiso.....	381	183	564
Gamboa.....	40	37	77
Gatun.....	462	226	688
Colon.....	2,520	7,238	9,758
Total.....	9,606	8,256	17,862

TABLE XII.—CONSOLIDATED HOSPITAL AND EMPLOYEES TREATED IN QUARTERS REPORT.

	Re- main- ing July 1, 1916.		Admitted.		Died.		Discharged.		Trans- ferred.		Re- main- ing June 30, 1917.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
Hospitals.....	268	643	6,302	5,600	74	380	5,939	4,734	141	424	316	705
Quarters.....	13	18	4,360	1,736	.....	.....	4,286	1,648	69	67	18	39
Total.....	281	661	10,562	7,336	74	380	10,225	6,382	210	491	334	744

	White.	Colored.	Total.
Total admissions to hospitals, excluding Corozal farm and chronic ward..	6,187	5,529	11,716
Total admissions of employees to quarters.....	4,360	1,736	6,096
Total.....	10,547	7,265	17,812
Less number of patients transferred from quarters to hospitals, and between hospitals, whose admissions are duplicated in above figures.....	350	893	1,243
Net admissions to hospitals and quarters.....	10,197	6,372	16,569
Total admissions of employees to quarters.....	4,360	1,736	6,096
Total admissions of employees to hospitals.....	1,533	3,308	4,841
Total admissions of employees.....	5,893	5,044	10,937
Less number transferred between hospitals, etc.....	114	270	384
Net admissions of employees to hospitals and quarters.....	5,779	4,774	10,553
Annual average per 1,000—admissions of employees.....	1,234.30	162.84	310.40

TABLE XII-A.—CONSOLIDATED DISPENSARY REPORT OF ALL CASES TREATED BUT NOT EXCUSED.

Stations.	Employees.			Nonemployees.			Total.		
	White.	Colored.	Total.	White.	Colored.	Total.	White.	Colored.	Total.
Ancon.....	31,831	55,530	87,361	23,647	40,041	63,688	54,478	95,571	150,049
Balboa.....	44,813	47,689	92,502	31,489	11,562	43,051	76,302	59,251	135,553
Pedro Miguel.....	11,917	17,036	28,953	9,818	5,948	15,766	21,735	22,984	44,719
Paraiso.....	9,864	31,630	41,494	8,034	9,126	17,160	17,898	40,756	58,654
Gamboa.....	732	2,656	3,388	332	3,667	3,999	1,064	6,323	7,387
Gatun.....	3,808	14,842	18,650	7,163	12,804	19,967	10,971	27,646	38,617
Colon.....	16,753	50,308	67,061	12,135	13,084	25,219	28,888	63,392	92,280
Total.....	119,718	219,691	339,409	92,618	96,232	188,850	211,336	315,923	527,259

TABLE XIII.—AVERAGE NUMBER OF EMPLOYEES CONSTANTLY SICK IN HOSPITALS AND QUARTERS.

HOSPITALS.

	White.	Colored.	Total.
Ancon Hospital.....	49.93	176.55	226.48
Colon Hospital.....	7.01	16.77	23.78
Palo Seco Leper Asylum.....		.31	.31
Total.....	56.94	193.63	250.57

QUARTERS.

	White.	Colored.	Total.
Ancon.....	5.95	0.46	6.41
Balboa.....	10.02	.98	11.00
Pedro Miguel.....	1.03	.12	1.15
Paraiso.....	1.05	.50	1.55
Gamboa.....	.11	.10	.21
Gatun.....	1.26	.62	1.88
Colon.....	6.90	19.83	26.73
Total.....	26.32	22.61	48.93

TABLE XIII-A.—AVERAGE NUMBER OF EMPLOYEES CONSTANTLY SICK.

	White.	Colored.	Total.
Hospitals.....	56.94	193.63	250.57
Quarters.....	26.32	22.61	48.93
Total.....	83.26	216.24	299.50

TABLE XIII-B.—AVERAGE NUMBER OF EMPLOYEES CONSTANTLY SICK PER 1,000.

	White.	Colored.	Total.
Hospitals.....	12.16	6.61	7.37
Quarters.....	5.62	.77	1.44
Total.....	17.78	7.78	8.81

TABLE XIV.—AVERAGE NUMBER OF DAYS' STAY IN HOSPITALS OR QUARTERS FOR EACH ADMISSION OF SICK EMPLOYEE.

HOSPITALS.

	White.	Colored.	Total.
Ancon Hospital.....	14.87	24.53	21.45
Colon Hospital.....	8.20	8.90	8.65

QUARTERS.

	White.	Colored.	Total.
Ancon.....	1.84	5.01	1.93
Balboa.....	2.29	2.90	2.33
Pedro Miguel.....	2.38	5.00	2.52
Paraiso.....	3.07	2.82	2.98
Gamboa.....	3.08	2.06	2.50
Gatun.....	2.94	3.53	3.11
Colon.....	2.23	5.20	3.87

TABLE XV.—PATIENTS OTHER THAN EMPLOYEES TREATED IN HOSPITALS AND AMOUNTS RECEIVED FOR THEIR TREATMENT.

	Number of admissions.	Number of days' treatment.	Revenue received.
Paid for by Panama Republic:			
Insane.....	127	74,303	\$63,379.50
Colon Hospital.....	135	392	1,133.94
Palo Seco Leper Asylum.....	6	14,471	10,856.32
Total.....	268	89,166	75,369.76
Charity patients (for whom department of civil government pays \$2,400 per year).....	684	48,845	2,400.00
Outside pay patients.....	362	7,677	28,452.49
Families of employees.....	3,273	41,415	50,319.13
Soldiers.....	2,374	32,548	57,935.93
Public Health Service.....	201	4,847	7,278.50
Residents of Panama, emergency charity patients.....	30	226	.....
Total.....	7,192	224,724	221,755.81

TABLE XVI.—SURGICAL OPERATIONS PERFORMED IN HOSPITALS.

	Ancon Hospital.		Colon Hospital.		Total.	
	Number.	Died.	Number.	Died.	Number.	Died.
Amputations:						
Shoulder.....	2	.....	.....	.....	2	.....
Forearm.....	1	.....	1	.....	2	.....
Hand.....	.....	.....	1	.....	1	.....
Hip joint.....	1	.....	.....	.....	1	.....
Thigh.....	1	.....	1	.....	2	.....
Leg.....	7	1	.....	.....	7	1
Foot.....	1	.....	1	.....	2	.....
Digits, multiple.....	11	.....	2	.....	13	.....
Thigh, double.....	.....	.....	1	.....	1	.....
Leg, double.....	3	.....	.....	.....	3	.....
Operations on bones:						
Cranietomy, decompressive.....	2	.....	.....	.....	2	.....
Cranietomy, exploratory.....	.....	.....	2	.....	2	.....
Ostietomy.....	19	.....	8	.....	27	.....
Resection of shoulder.....	1	.....	.....	.....	1	.....
Resection of knee.....	.....	.....	2	.....	2	.....
Wiring of fractures, simple.....	25	.....	.....	.....	25	.....
Wiring of fractures, compound.....	6	.....	.....	.....	6	.....
Adenectomy:						
Cervical.....	20	.....	.....	.....	20	.....
Axillary.....	5	.....	.....	.....	5	.....
Inguinal, single.....	136	.....	1	.....	137	.....
Inguinal, double.....	34	.....	.....	.....	34	.....
Femoral.....	24	.....	.....	.....	24	.....
Herniotomy:						
Inguinal, single.....	88	.....	35	.....	123	.....
Inguinal, double.....	15	.....	18	.....	33	.....
Femoral.....	1	.....	.....	.....	1	.....
Ventral.....	16	.....	.....	.....	16	.....
Strangulated.....	.....	.....	4	.....	4	.....
Genito-urinary tract:						
Nephrotomy.....	5	1	.....	.....	5	1
Nephrectomy.....	2	.....	.....	.....	2	.....
Nephropexy.....	3	.....	.....	.....	3	.....
Cystotomy.....	1	.....	.....	.....	1	.....
Urethrotomy, internal.....	15	1	1	.....	16	1
Urethrotomy, external.....	26	2	2	.....	28	2
Prostatectomy.....	1	.....	.....	.....	1	.....
Varicocele, radical cure.....	25	.....	5	.....	30	.....
Hydrocele, single, radical cure.....	25	.....	4	.....	29	.....
Hydrocele, double, radical cure.....	7	.....	2	.....	9	.....
Orchidectomy.....	12	.....	1	.....	13	.....
Epididymetomy.....	101	.....	1	.....	102	.....
Amputation of the scrotum.....	2	.....	.....	.....	2	.....
Amputation of the penis.....	1	.....	.....	.....	1	.....
Curetage uteri.....	87	.....	22	.....	109	.....
Perineoplasty.....	12	.....	.....	.....	12	.....
Trachelorrhaphy.....	11	.....	6	.....	17	.....
Vaginal punctures.....	1	.....	1	.....	2	.....

TABLE XVI.—SURGICAL OPERATIONS PERFORMED IN HOSPITALS—Continued.

	Ancon Hospital.		Colon Hospital.		Total.	
	Number.	Died.	Number.	Died.	Number.	Died.
Obstetrical:						
Caesarian section, abdominal.....	7	3	2	.....	9	3
Caesarian section, vaginal.....	1	.....	.....	.....	1	.....
High forceps.....	3	.....	1	.....	4	.....
Low forceps.....	6	.....	1	.....	7	.....
Version.....	4	.....	4	.....	8	.....
Perineorrhaphy.....	6	.....	2	.....	8	.....
Thorax:						
Thoracotomy.....	2	.....	.....	.....	2	.....
Excision of breast and axilla.....	1	.....	.....	.....	1	.....
Stab wound of chest, operation for.....	.....	.....	1	.....	1	.....
Rectum:						
Hemorrhoids, radical cure.....	101	.....	16	.....	117	.....
Fistula in anus, excision of.....	18	.....	3	.....	21	.....
General:						
Thyroidectomy.....	7	1	.....	.....	7	1
Aneurismorrhaphy.....	1	.....	1	.....	2	.....
Varicose veins, excision of.....	17	.....	.....	.....	17	.....
Tenorrhaphy.....	10	.....	6	.....	16	.....
Myorrhaphy.....	1	.....	3	.....	4	.....
Excision of surface neoplasms.....	36	.....	3	.....	39	.....
Stab wound of soft parts, operation for.....	.....	.....	2	.....	2	.....
Extensive injuries to soft parts, operation for.....	1	.....	19	.....	20	.....
Plastic operation for congenital defect.....	2	.....	.....	.....	2	.....
Plastic operation for severe injuries.....	4	.....	.....	.....	4	.....
Plastic operation for effects of disease.....	11	1	.....	.....	11	1
Skin graft.....	3	.....	.....	.....	3	.....
Laparotomy:						
For general peritonitis.....	7	2	1	1	8	3
For tuberculous peritonitis.....	2	.....	1	.....	3	.....
For intestinal obstruction.....	4	.....	1	.....	5	.....
Exploratory.....	20	5	1	.....	21	5
Gastro-enterostomy.....	8	1	5	.....	13	1
Entero-enterostomy.....	1	.....	.....	.....	1	.....
Enterectomy.....	2	.....	.....	.....	2	.....
Appendectomy.....	128	.....	46	.....	174	.....
Appendectomy with local peritonitis.....	19	.....	8	1	27	1
Appendectomy with general peritonitis.....	1	.....	1	.....	2	.....
Colestomy.....	3	1	.....	.....	3	1
Sigmoidopexy.....	1	.....	.....	.....	1	.....
Cholecystotomy.....	3	.....	.....	.....	3	.....
Cholecystostomy.....	1	.....	.....	.....	1	.....
Cholecystectomy.....	6	.....	1	.....	7	.....
Abscess of liver, laparo-hepatotomy for.....	3	1	1	.....	4	1
Abscess of liver, thoraco-hepatotomy for.....	2	1	.....	.....	2	1
Splenectomy.....	1	.....	.....	.....	1	.....
Pan-hysterectomy.....	5	1	1	.....	6	1
Supravaginal hysterectomy.....	68	2	1	.....	69	2
Hysteromyomectomy.....	47	.....	.....	.....	47	.....
Myomectomy.....	2	.....	1	.....	3	.....
Salpingectomy, single.....	12	.....	.....	.....	12	.....
Salpingectomy, double.....	6	.....	.....	.....	6	.....
Salpingo-cophorectomy.....	28	.....	2	.....	30	.....
Ovarian cystectomy.....	11	.....	.....	.....	11	.....
Oophorectomy.....	4	.....	.....	.....	4	.....
Suspensio-uteri.....	56	.....	6	.....	62	.....
Plastic operation for chronic pelvic peritonitis.....	10	1	.....	.....	10	1
For ectopic gestation.....	7	1	1	.....	8	1
Gastrectomy.....	1	.....	.....	.....	1	.....
Mayo bunion operations.....	9	.....	.....	.....	9	.....
Major operations, various other.....	30	2	.....	.....	30	2
Minor operations, various other.....	1,415	2	124	.....	1,539	2
Minor operations, Colon Hospital dispensary.....	.....	.....	1,820	.....	1,820	.....
Total.....	2,921	30	2,208	2	5,129	32

TABLE XVII.—OPERATIONS AND WORK PERFORMED IN EYE, EAR, NOSE, AND THROAT CLINICS.

Operations.	Number.	Operations.	Number.
Adenoidectomy.....	152	Pterygium, transplantation.....	67
Abscess, mastoid region.....	1	Perforation right antrum.....	1
Adenoidectomy and tonsillectomy.....	80	Removal of steel from eye ball (magnet).....	1
Cataract needling.....	1	Submucous resection of nasal septum.....	163
Chalazion.....	9	Tonsillectomy.....	143
Evisceration.....	5	Turbinectomy.....	45
Excision of chalazion.....	3	Trephine of sclera.....	5
Expression, both eyes.....	1	Trephine Fergus Elliott.....	1
Extraction of cataract.....	4	Urlectomy.....	3
Fracture of nose, reduction of.....	2	Various minor operations.....	37
Lachrymal sac-incision and drainage.....	1	Total.....	736
Mastoidectomy.....	2	Refractions.....	1,225
Plastic on eye.....	3	Outside cases treated.....	6,248
Plastic on nose.....	4		
Pterygium, excision.....	2		

NOTE.—No deaths resulted from above operations.

TABLE XVIII.—CONSOLIDATED WARD LABORATORY REPORT ANCON AND COLON HOSPITALS.

Blood examinations.....	8,250	Urine examinations—Continued.....	
Estivo-autumnal.....	769	Sugar.....	4,293
Tertian.....	186	Pus and blood.....	12,057
Mixed tertian and estivo-autumnal.....	2	Indican.....	1,587
Quartan.....	8	Epithelia.....	12,043
Differential blood counts.....	231	Bile.....	240
Leucocyte counts.....	861	Trichomonas vaginalis.....	3
Red blood counts.....	107	Hemin crystals.....	66
White blood counts.....	178	Gualac tests.....	1,278
Hemoglobeln estimations.....	2,500	Ciliated monads.....	22
Stool examinations.....	7,458	Triple phosphates.....	5
Ascaris lumbricoides.....	79	Red blood cells.....	83
Uncinaria ova.....	289	Quantitative estimation of albumen in urine.....	43
Trichocephalus dispar.....	199	Acetone tests.....	79
Strongyloides intestinalis.....	173	Calcium oxalates.....	6
Ameba.....	32	Sputum examinations.....	4,287
Entameba.....	7	Tubercle bacilli.....	312
Ciliated monads.....	92	Smear examinations.....	590
Bilharzia.....	3	Examinations of spinal fluid.....	106
Pus and blood.....	737	Examinations of vaginal and urethral discharges.....	430
Balantidium coli.....	3	Examinations of the eye.....	21
Entameba histolytica and tetragena.....	15	Examinations of urine sediment.....	17
Gualac tests.....	280	Fluid from knee.....	3
Cercomonas, intestinalis.....	26	Nasal.....	3
Tenia saginata dispar (ova).....	16	Vomit.....	3
Blood and mucus.....	2	Miscellaneous.....	13
Oxyuris, vermiculosis.....	4	Sputum.....	7
Uncinaria (parasites).....	6	Blood cultures.....	5
Urine examinations.....	26,179	Throat cultures.....	14
Albumen.....	6,427		
Casts.....	5,189		

TABLE XIX.—SANTO TOMAS HOSPITAL.

	Remain- ing July 1, 1916.	Ad- mitted.	Died.	Dis- charged.	Remain- ing June 30, 1917.
Pay patients.....	14	922	33	879	24
Charity patients.....	429	10,019	1,006	9,034	408
Total.....	443	10,941	1,039	9,913	432

Average number of days' treatment per patient..... 14.68
 Average number of patients constantly sick..... 440.50
 Number of days relief furnished patients..... 160,781

TABLE XIX.—SANTO TOMAS HOSPITAL—Continued.

SURGICAL OPERATIONS.

	Number.	Deaths.		Number.	Deaths.
Amputations:			Rectum—Continued.		
Arm.....	1		Prolapsus rectum, radical		
Forearm.....	1		excision.....	2	
Hand.....	2		General:		
Thigh.....	1		Varicose veins, excision of..	4	
Leg.....	4		Excision of surface neo-		
Foot.....	3		plasms.....	14	
Digits, multiple.....	28		Gunshot wound of soft		
Operations on bones:			parts, operation for.....	9	
Cranectomy, decompressive	1		Stab wound to soft parts,		
Osteotomy.....	8		operation for.....	3	1
Excision of maxilla.....	4	1	Plastic operation for severe		
Resection of elbow.....	1		injuries.....	4	
Wiring of fractures, simple.	4		Plastic operation for effects		
Wiring of fractures, com-			of disease.....	61	1
pound.....	4		Skin graft.....	98	
Adenectomy:			Laparotomy:		
Cervical.....	18		For general peritonitis.....	1	1
Axillary.....	2		For tuberculous peritonitis.	1	1
Inguinal, single.....	72		For intestinal obstruction..	1	
Inguinal, double.....	21		Exploratory.....	6	3
Femoral.....	1		Gastrotomy.....	1	
Herniotomy:			Gastro-enterostomy.....	1	
Inguinal, single.....	113	1	Entero-enterostomy.....	1	
Inguinal, double.....	13		Appendectomy.....	84	1
Femoral.....	2		Appendectomy with local		
Ventral.....	10		peritonitis.....	8	
Combined, any two of			Appendectomy with general		
above.....	1		peritonitis.....	2	
Strangulated.....	6	1	Colostomy.....	1	
Genito-urinary tract:			Cholecystostomy.....	3	
Perinephritic abscess,			Cholecystostomy.....	1	1
drainage of.....	1		Cholecystostomy.....	1	
Cystotomy.....	4		Cholecholestomy.....	1	
Urethrotomy, internal.....	22	1	Abscess of liver, laparo-hepa-		
Urethrotomy, external.....	55	3	tomy.....	5	1
Varicocele, radical cure..	2		Abscess of liver, thoraco-		
Hydrocele, single, radical			hepatotomy for.....	5	
cure.....	31		Splenectomy.....	3	1
Hydrocele, double, radical			Panhysterectomy.....	20	2
cure.....	4		Supravaginal hysterectomy.	30	
Orchidectomy.....	10		Hysteromyomectomy.....	1	
Epididymotomy.....	4		Myomectomy.....	2	
Amputation of the scrotum.	1		Salpingectomy, single.....	18	
Amputation of the penis.....	3		Salpingectomy, double.....	24	
Curettage uteri.....	90		Salpingo-oophorectomy.....	64	
Perineoplasty.....	8		Ovarian cystectomy.....	3	
Trachelorrhaphy.....	5		Oophorectomy.....	5	
Vaginal sections.....	16		Suspensio-uteri.....	58	
Vaginal punctures.....	3		For ectopic gestation.....	4	
Circumcision.....	111	1	Major operations, various other.	78	
Obstetrical:			Minor operations, various other.	572	1
Cæsarian section, abdomi-			Adenoidectomy.....	38	
nal.....	1		Tonsillectomy.....	70	
Perineorrhaphy.....	2		Mastoidectomy.....	1	
Thorax:			Enucleation eye.....	3	
Thoracotomy.....	2	1	Needling of eye.....	1	
Excision of breast and axilla	2		Pterygium.....	1	
Rectum:			Total.....	2,079	23
Hemorrhoids, radical cure..	48				
Fistula in anus, excision of.	19				

TABLE XX.—BOARD OF HEALTH LABORATORY.

Bacteriological examinations:		Bacteriological examinations—Con.	
Fluids and exudates.....	115	Dark field examinations.....	78
Blood cultures.....	224	Blood for malaria.....	33
Throat cultures (diphtheria		Smears, gonococcus.....	51
suspects).....	865	Amebic pyorrhea.....	11
Cultures from autopsies.....	21	Smallpox allergin test (posi-	
Stools.....	554	tive).....	1
Urines.....	530	Blood for trepanosomes.....	1
Sputum.....	43	Ice cream.....	26
Leper suspects.....	39	Water.....	2
Agglutination reactions.....	22	Miscellaneous.....	24
Dairy milk from Panama and		Chemical examinations:	
Colon (bacteriological		Milk from private dairies sup-	
counts).....	21	plying Panama and Colon.....	33
Dairy milk from Corozal farm		Milk from Corozal farm.....	89
(bacteriological counts).....	318	Mother's milk.....	38

Chemical examinations—Continued.		Blood films, various	49
Spinal fluids	848	Buzzards examined for blood, muscle, and ectoparasites	199
Urines	146	Dogs under observation for rabies	8
Butyric acid	10	Ameba, examinations of appendix for	1
Alcoholic liquors, various	5	Rats examined:	
Other liquids, fluids, etc.	14	Mus norvegicus	6,483
Metals, various	9	Mus musculus	6,504
Condensed milk	6	Mus rattus	1,985
Stomach contents	6	Mus alexandrinus	668
Powder for cocaine	4	Undertaker's department:	
Gasoline	2	Bodies embalmed	56
Ice cream	14	Interments at Corozal Cemetery	148
Kerosene	2	Bodies taken to Panama for burial	46
Water	1	Bodies shipped to Mount Hope for burial	12
Powder for opium	1	Bodies shipped to the United States	18
Beef	2	Bodies shipped to Paraiso	1
Soil, samples of	3	Cremations	252
Miscellaneous	28	General:	
Pathological tissues prepared, frozen	338	Wassermann reactions	10,663
Pathological tissues prepared, paraffin	3,766	Vaccine points manufactured	9,429
Surgical pathological tissues and neoplasms reported	503	Antityphoid vaccinations	23
Autopsies performed	343	Animal inoculations	108
Animals autopsied	262	Autogenous vaccines prepared	26
Placental smears examined	245	Toxicological examinations	14
Fetus inspection	7	Throat smears for Vincent's angina	2
Cadavers examined for police	2	Entomological examinations	2
Brain smears examined for Babesia bigemina (positive 126)	132		
Blood films for malaria	17		
Blood films from horses	7		

TABLE XXI.—SANITATION.

CITY OF PANAMA.

Mosquito, rat, and fly work:	
Miles of ditches cleaned and maintained	102.5
Miles of ditches dug	2.0
Acres of pools oiled	676
Water containers treated	149,140
Mosquito-breeding places found	3,626
Quarts of flies trapped (13,000 to quart)	1,493
Square acres of vegetation removed	57
Rats trapped	11,883
Fly-breeding places found and destroyed	754
Disinfection work: Rooms disinfected	197
Material used:	
Crude oil (gallons)	43,455
Kerosene	1,627
Larvacide	5,704
Inspection of houses and yards:	
Buildings inspected	49,995
Notices served and nuisances abated	4,163
Old buildings condemned	125
Private properties cleaned	36
Buildings demolished	50
Plans for new buildings approved	170
Permits granted for repairs to old buildings	1,029
Total building permits issued	1,197
Sewer connections made	30
Garbage collections:	
Loads of garbage removed to dump and burned	56,717
Total number of cans of garbage emptied	519,207
Street cleaning:	
Square yards of streets cleaned daily	600,000
Square yards of streets sprinkled daily	37,500
Vaccinations: Total number of vaccinations since Apr. 1, 1914	25,395

CITY OF COLON.

[Including Cristobal, Mount Hope, and Coco Solo.]

Water and sewers:	
Connections made during the year	109
Total number of connections made to date	1,432
Outstanding permits (June 30)	50
Houses in which extensions were made	104
Houses:	
Plans approved	82
Permits to repair issued	520
Permits to occupy issued	104
Bills collected for work for private parties	1,486

Colon:

Loads of garbage removed	6,485
Average number of cans of garbage removed daily	2,031
Acres of vegetation removed	485
Acres of streets cleaned	9,705
Private properties cleaned	11,939
Acres of pools oiled	182
Mosquito-breeding places destroyed	12
Water receptacles treated	578,612
Lineal feet of ditches constructed	10,815
Miles of ditches maintained	4.5
Mosquitoes caught on hospital screens	10,306
Nuisances abated	4,884
Buildings inspected	128,673
Rats killed	5,148
Acres of alleys cleaned	1,650
Acres of streets sprinkled	337
Fly-breeding places destroyed	18
Gallons of larvacide used	1,418
Gallons of crude oil used	12,108
Doses of quinine issued	32,802
Dogs killed	66
Cubic yards fumigated	9,531

Cristobal:

Acres of pools oiled	23
Water receptacles treated	82,850
Mosquito-breeding places destroyed	12
Fly-breeding places destroyed	5
Buildings inspected	18,560
Gallons of larvacide used	169
Gallons of crude oil used	3,137
Loads of garbage removed	2,556
Cans garbage removed	170,610
Nuisances abated	615

Mount Hope:

Acres of pools oiled	261
Water receptacles treated	149,095
Miles of ditches maintained	30.9
Mosquito-breeding places destroyed	1,211
Miles of ditches constructed	9.9
Mosquitoes killed in outfit cars and quarters	20,966
Mosquitoes killed in barracks	24,934
Gallons of crude oil used	21,494
Gallons of larvacide used	745
Cans garbage removed	10,486
Acres of vegetation removed	403
Mosquitoes caught on boats	1,061
Burials during year	500

Coco Solo:

Acres of vegetation removed	410
Gallons of crude oil used	2,781
Yards of ditches constructed (lineal)	561

CANAL ZONE.

Work requests on supply department:

Grass cutting	297
Screening	108
Miscellaneous	101
Work requests on municipal engineering division	175
Work requests on other divisions	18
Notices served to abate nuisances	25
Arrests for violations of sanitary regulations	2
Convictions	2
Buildings inspected:	
For screening	16,668
For mosquitoes	52,264
For general sanitation	25,112
For safety	31
Stores, inspection of	258
Restaurants, inspection of	112
Shops, inspection of	506
Closets disinfected	8,304
Garbage cans emptied daily	2,782
Pit closets inspected	7,903
Houses disinfected or fumigated	53
Sewer connections made	20
Rat traps in use	365
Rats destroyed	7,374
Mosquitoes destroyed in dwellings:	
Anopheles	18,784
Stegomyia	628
Culex	107,018
Mansonia	103,032
Number of containers found with stegomyia larvæ	1
Fly-breeding places destroyed	36
Material expended:	
Larvacide, gallons	4,115
Crude oil, gallons	136,781
Kerosene, gallons	6,857

TABLE XXII.—QUARANTINE SERVICE.

PORTS OF BALBOA-PANAMA AND COLON-CRISTOBAL.

Vessels inspected and passed	2,555	
Vessels passed on medical officer's certificate	5	
Vessels transitting canal in quarantine	100	
Vessels held in quarantine	168	
Total number of vessels entered	2,828	
Supplemental inspections of vessels at docks	794	
Total number of inspections of vessels		3,622
Bills of health issued		2,669
Bills of health viséed		696
Vessels fumigated on arrival		204
Vessels fumigated prior to departure		11
Persons vaccinated at port of arrival because of compulsory vaccination law	3,411	
Persons vaccinated at port of departure or en route	8,780	
Total number of persons vaccinated		12,191
Persons held at detention stations to complete period of incubation of yellow fever or bubonic plague	3,656	
Persons held on board vessels to complete period of incubation of yellow fever or bubonic plague	24,055	
Poliomyelitis suspects detained	45	
Total number of persons held in quarantine		27,756
Persons landed from foreign ports:		
Cabin	18,771	
Steerage	19,197	
		37,968
Persons arriving from coast towns on small craft		19,902
Persons departing for coast towns on small craft		18,410
Crew inspected	161,404	
Passengers inspected	49,926	
Stowaways found on board incoming vessels	59	
Persons passed on medical officer's certificate	1,783	
Total number of persons inspected and passed		213,172
Supplementary inspection of crew and passengers		10,191
Inspections of docks		37
Immigrants rejected and deported		319

PORT OF BOCAS DEL TORO.

Vessels inspected and passed	208
Crew inspected and passed	14,488
Passengers inspected and passed	2,783
Passengers in transit inspected and passed	2,068

TABLE XXIII.—PERSONNEL REPORT.

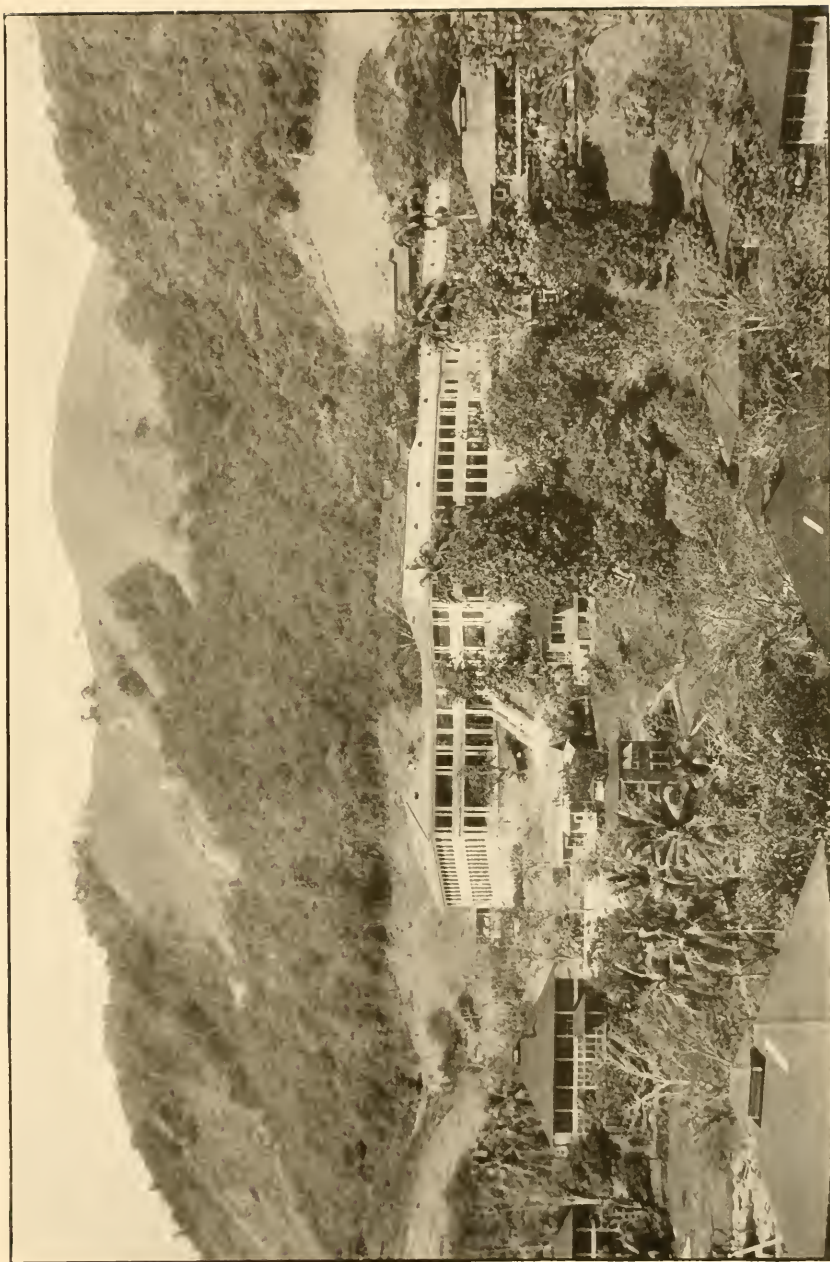
[Average number of employees at work during year.]

	1916-17	1915-16	June 30, 1917.		
	Total.	Total.	Gold.	Silver.	Total.
Chief health office	4	4	3		3
Medical storehouse	8	8	4	4	8
Quarantine service	46	43	13	35	48
Health office, Panama	153	164	12	136	148
Health office, Colon	169	175	10	169	179
Ancon Hospital	317	313	112	214	326
Colon Hospital	42	38	17	26	43
Santo Tomas Hospital	6	6	7		7
Palo Seco Leper Asylum	32	26	2	21	23
Zone sanitation	125	127	5	132	137
Corozal Hospital	120	89	16	110	126
Dispensaries:					
Balboa	8	6	7	3	10
Gamboa	1	1	1		1
Gatun	4	4	2	2	4
Paraiso	4	4	2	2	4
Pedro Miguel	3	3	2	2	4
Corozal		2			
Total	1,045	1,013	215	856	1,071

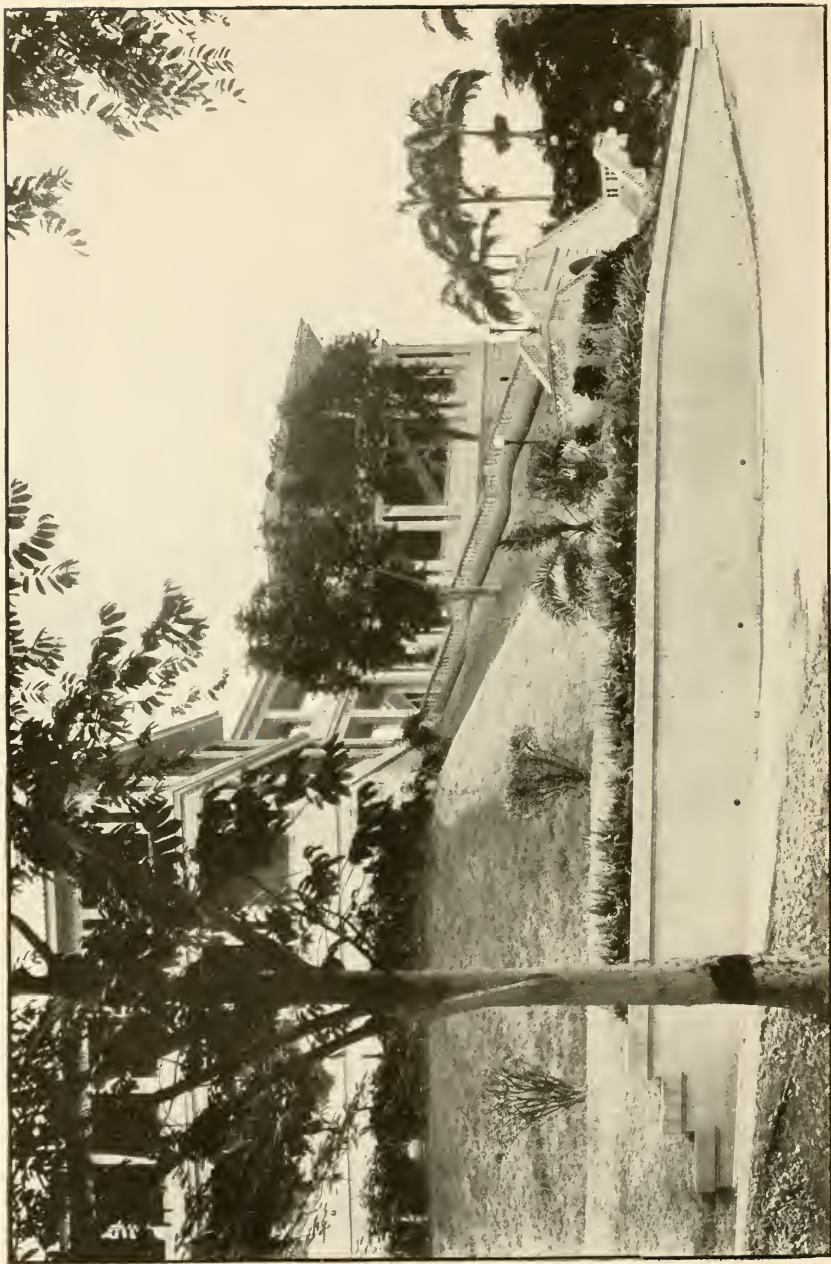
TABLE XXIV.—HOSPITAL AND TOTAL CASES OF MALARIA AMONG EMPLOYEES.

	Admissions.				Deaths.		Total cases.		Annual average per 1,000 deaths.	Annual average per 1,000 cases.	Number of employees.
	White.		Colored.				Hospital.	Total. ¹			
	Hospital.	Total. ¹	Hospital.	Total. ¹							
July.....	26	30	88	89	0	0	114	119	.....	42	33,787
August.....	14	21	63	63	0	0	77	84	.....	30	33,609
September.....	9	10	28	29	0	0	37	39	.....	14	33,528
October.....	18	18	19	19	0	1	37	37	0.36	13	33,272
November.....	3	3	12	13	0	0	15	16	.....	5	35,031
December.....	8	9	15	15	0	0	23	24	.....	8	34,327
January.....	10	11	15	15	0	1	25	26	.35	11	34,727
February.....	6	7	11	11	0	0	17	18	.....	6	34,166
March.....	11	13	10	10	1	0	21	23	.36	8	33,297
April.....	6	7	4	4	0	0	10	11	.....	4	36,061
May.....	12	12	15	16	0	0	27	28	.....	10	33,927
June.....	14	15	17	18	0	0	31	33	.....	12	33,251
Total.....	137	156	297	302	1	2	434	458	.088	13	33,998

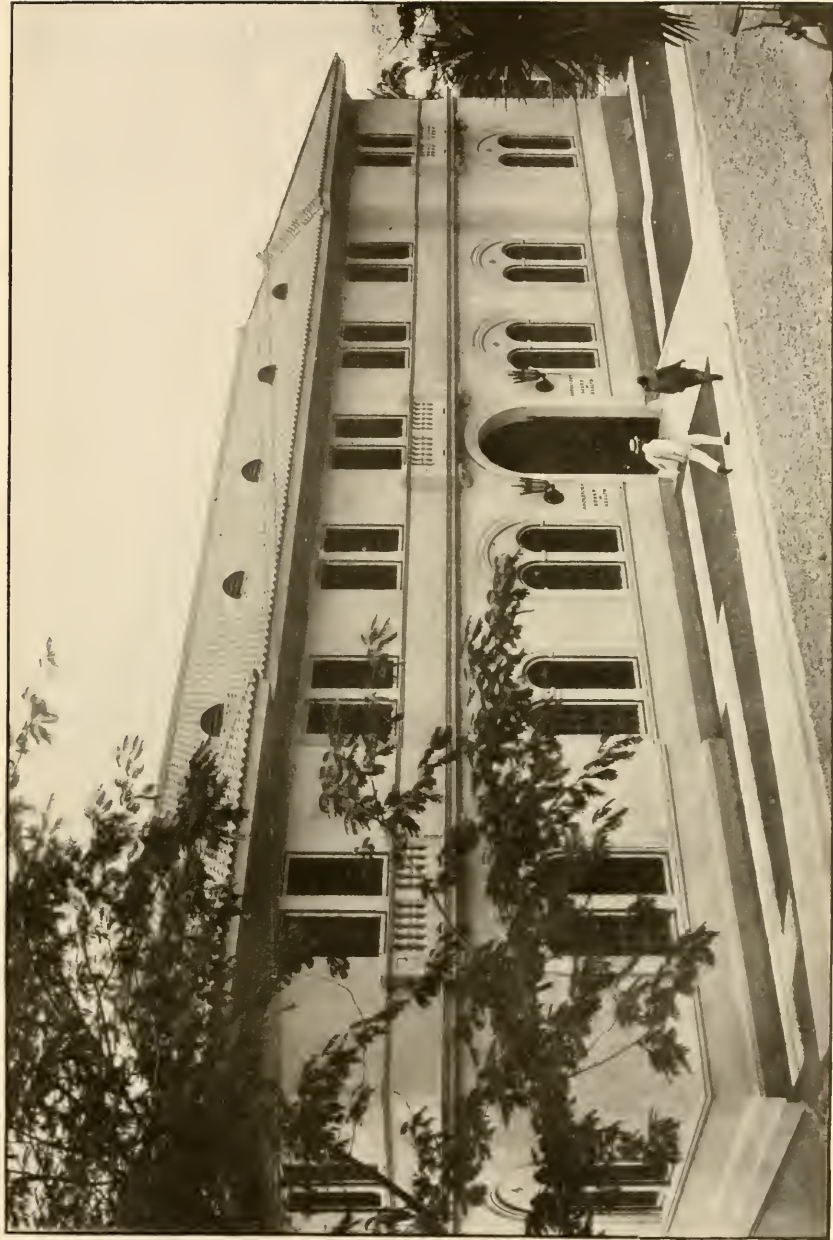
¹ Includes hospitals and quarters.



NEW ANCON HOSPITAL. FEBRUARY, 1917



NEW ANCON HOSPITAL. MAIN STAIRWAY. JUNE, 1917.



NEW ANCON HOSPITAL, THE LABORATORY. JULY, 1917.



NEW ANCON HOSPITAL. SECTION B. JUNE, 1917.



NEW ANCON HOSPITAL, ADMITTING OFFICE AND DISPENSARY. JULY, 1917.

APPENDIX K.

REPORT OF THE GENERAL PURCHASING OFFICER AND CHIEF OF THE WASHINGTON OFFICE.

THE PANAMA CANAL,
Washington, D. C., July 17, 1917.

SIR: I have the honor to submit the following report on the work of the Washington office during the fiscal year ended June 30, 1917:

The undersigned has continued on duty throughout the year as general purchasing officer and chief of the Washington office. The following divisions are under my charge as such: General office, including the appointment division and the correspondence and record division; office of the assistant auditor; and the purchasing department.

There has been no material change in the organization during the fiscal year, although the loss of employees through transfers and resignations has been quite heavy.

More than the usual amount of labor was involved in securing an adequate supply of skilled mechanics in the United States, especially in the shipbuilding and repairing trades, due to the abnormal activities in the various manufacturing plants and shipyards, caused by the war, and the rising scale of wages paid at such plants. The difficulty experienced in securing acceptances from among those selected for appointment is evidenced by the fact that 54 per cent of those tendered employment failed to accept, as against 48 per cent during the preceding fiscal year. During the year 1,417 persons within the United States were tendered employment for duty on the Isthmus in grades above that of laborer; 767 accepted and were appointed, covering 72 different positions. Three thousand six hundred and forty-nine persons, including new appointees, those returning from leave of absence, members of employees families and employees of contractors and their families, were provided with transportation from the United States to the Isthmus; and in response to inquiries and applications for employment during this period and in the issuance of appointments 18,421 letters were written, 3,401 telegrams sent, and 25,009 circulars mailed, being an increase in each item over the preceding fiscal year.

The work of the correspondence and record division has continued heavy, due, first, to the necessity of preparing and submitting to Congress numerous items of special legislation, and, second, to the large number of military matters handled through this office. In addition, this division handles practically all correspondence

relating to matters of general policy; replies to the many questions which are constantly being propounded concerning the canal, both by shipping interests and the general public; keeps track of legislation relating to or of interest to the canal, and obtains copies of bills and other congressional documents for the Isthmus; handles enciphering and deciphering of all cables, as well as revision of codes from time to time; conducts correspondence regarding estates of deceased employees and deportations of indigents and insane; handles distribution of The Panama Canal Record, navigation circulars, annual reports, and other canal literature. The work of recording, indexing, and filing of general correspondence is also carried on in this division.

The following statements show the volume of the transactions in the office of the assistant auditor, which includes the work of the disbursing clerk:

Claim statement.

On hand July 1, 1916-----	464
Received from July 1, 1916, to June 30, 1917-----	18, 214
<hr/>	<hr/>
To be accounted for-----	18, 678
Passed for payment from July 1, 1916, to June 30, 1917-----	18, 321
<hr/>	<hr/>
On hand June 30, 1917-----	357

There was a decrease of 157 claims received, and an increase of 213 claims examined and passed for payment over the preceding year.

Financial statement of receipts and disbursements, July 1, 1916, to June 30, 1917.

Disbursing clerk's balance July 1, 1916-----	\$654, 886. 39
Receipts:	
From United States Treasury-----	\$11, 360, 000. 00
Miscellaneous collections-----	508, 376. 19
<hr/>	<hr/>
	11, 868, 376. 19
<hr/>	<hr/>
To be accounted for-----	12, 523, 262. 58
Disbursements:	
Vouchered expenditures-----	10, 853, 282. 68
Repayments to appropriations-----	881, 374. 98
Refundments on collections-----	61, 215. 10
Income tax paid to internal-revenue collector-----	81. 00
Collections deposited to appropriations miscellaneous receipts-----	480, 027. 57
<hr/>	<hr/>
	12, 275, 981. 33
<hr/>	<hr/>
	247, 281. 25
<hr/>	<hr/>
Disbursing clerk's balance June 30, 1917:	
General account as disbursing clerk-----	198, 017. 06
Special deposit account-----	49, 264. 19
<hr/>	<hr/>
	247, 281. 25

During the fiscal year 15,664 vouchers for payment, amounting to \$10,853,282.68; 274 collection vouchers, amounting to \$508,257.69 (not including \$118.50 income tax, and 1,249 settlements by transfer of appropriation, aggregating \$665,317.90, were given an administrative examination. This was an increase over the last preceding

fiscal year of 482 disbursement vouchers prepared and examined. There was an increase of disbursements made amounting to \$678,-688.66 more than for the preceding fiscal year, and an increase of \$138,191.14 in miscellaneous collections made. There was also an increase of \$248,317.90 in transfer settlements over the preceding fiscal year.

The duties of the assistant auditor's office include examination and certification of claims and accounts before payment by the disbursing clerk; handling correspondence relative to claims and accounts; preparation of vouchers; examination of cash, and net balances stated on monthly accounts current of the disbursing clerk before submission to the Auditor for the War Department for settlement; classification of all expenditures in United States covering salaries and incidental expenses, together with salaries and expenses in connection with purchase, inspection, and testing of material; issuance of bills collectible and collections made, including claims sent from Isthmus for transfer of appropriation and other bills chargeable to contractors; ascertaining and transmitting to the Isthmus monthly statements of Treasury Department and disbursing clerk's balances; preparation of annual bonds; preparation of reports for defense of suits in Court of Claims and other courts; checking and reporting on annual inventories of Panama Canal property in the United States; preparation of cablegrams to Isthmus advising of deposits for tolls and handling correspondence relating thereto.

During the fiscal year 169 contracts were prepared, amounting to \$5,096,989.48, an increase of 37 in number and \$723,192.26 in amount over the preceding year. Many cases involving questions of law were referred to the assistant auditor for examination and report during the year.

The assistant auditor, as the legal officer in the United States of The Panama Canal, has, by direction of the chief of office, continued to render assistance to the Department of Justice in connection with the preparation for trial, and at the trial, in the courts, of all cases in connection with contracts made by The Panama Canal. The following is a statement of the work performed in connection with cases in the various United States courts, and in the Court of Claims:

The two suits pending in the United States District Court for the Southern District of New York, entitled *A. J. Rennolds & Bro. v. United States*, one under Washington Order 52140 and one under Washington Order 52411, have been appealed by plaintiffs to the United States Circuit Court of Appeals for the Second Circuit. It will be remembered that these suits were decided by the district court in favor of The Panama Canal, and that judgment was obtained for damages on a counter claim in the amount of \$10,671.09. In a similar case, that of the Tweedie Trading Co., against The Panama Canal, the plaintiffs' appeal was dismissed by the United States Circuit Court of Appeals on the ground that the United States Supreme Court alone has jurisdiction to review judgments of courts in actions brought under the Tucker Act (24 Stat., 505). These suits of Rennolds & Bro. were brought under the same act and the United States district attorney for the Southern District of New York has consented that the cases go off the calendar pending the disposition of the Tweedie case. He has given notice that he

will move for a dismissal of the Renolds appeal if the Tweedie appeal to the Supreme Court of the United States is not prosecuted.

In the case of the United States *v.* D'Olier Engineering Co., in the United States District Court, Eastern District of Pennsylvania (W. 15368), in which judgment was rendered in favor of The Panama Canal, the decision of the lower court has been reversed by the United States Circuit Court for the Third Circuit. A motion has been made by the United States district attorney in this case for a rehearing and reargument, but the motion has not to this time been acted upon by the Circuit Court of Appeals.

In the case of the United States *v.* Pusey & Jones in the United States District Court, District of Delaware, involving an amount aggregating about \$18,000, a settlement has been made with the defendant. Under the terms of settlement The Panama Canal will be paid the entire excess cost of repurchase of the defective boiler furnished under Washington Order 20378, together with actual damages incurred in making certain repairs, etc. The contractors will be relieved of the payment of liquidated damages for delay and will have the defective boiler returned to them at Wilmington, Del.

Papers have been prepared and forwarded to the Attorney General for suit against the Norfolk Creosoting Co. under Washington Order 62879 for damages amounting to \$4,276.50 as additional cost and for liquidated damages caused by said company's default under its contract to furnish and deliver 200 creosoted piles to The Panama Canal. The Attorney General has stated that suit would be brought against this contractor in the United States Court for the Eastern District of Virginia.

In the case of W. E. Thomas *v.* United States, for damages said to have been caused by alleged erroneous rejection of hay furnished under Washington Order 26519, the Court of Claims has rendered judgment for plaintiff for \$961.73. Suit was brought for \$1,111.73.

A judgment has also been rendered in favor of the D. J. Kaufman & Co. *v.* United States (No. 30670 in the Court of Claims) for damages in the nature of demurrage arising under the Isthmian Canal Commission's contract for sale of scrap in the year 1906. A report of the facts in this case was made to the Department of Justice prior to the time when the present assistant auditor became connected with the office of the Isthmian Canal Commission.

In the case of the Union Foundry & Machine Co. *v.* United States, under Washington Order 24538, wherein plaintiffs sued for \$1,024.05, judgment has been rendered in favor of The Panama Canal.

In the case of the Bucyrus Co. *v.* United States, under Washington Order 13377, wherein suit was brought for \$889.61, judgment has been rendered by the Court of Claims in favor of The Panama Canal.

In the case of Wm. F. Brothers *v.* United States, under Washington Order 14813, wherein claim was made for \$137,600 for alleged damages said to have been caused by use of patent, judgment has been rendered by the Court of Claims in favor of The Panama Canal, claimant's petition having been dismissed.

In the case of Patrick Corr & Sons *v.* United States, under A. C. 1033, a report has been made to the Department of Justice of the facts in this case.

In the case of *Walter S. Dickey v. United States*, under various contracts, the matter is still pending. It is understood the case will be heard by the court at its fall term.

In the case of the Pelton Water Wheel Co., under Washington Orders 29725, 29725-A, and 29725-B, for \$4,175.09, liquidated damages, for \$1,051.43 as compensation for alleged extra work, and for interest, a report has been made to the Department of Justice of the facts in the case.

There are at this time no cases pending in any of the United States courts or in the Court of Claims upon which reports have not been prepared for transmission to the Department of Justice. It will, however, become necessary during the fiscal year ending June 30, 1918, for this office to assist the Department of Justice in the several cases now pending in those courts. This office is frequently called into consultation by attorneys representing the Government, and every possible assistance will be rendered as the needs arise.

The work of the purchasing department has been carried on in practically the same manner as fully set forth in previous annual reports, the organization being nominally under the supervision of the Chief of Engineers, United States Army, but in direct charge of an officer of the Corps of Engineers, as general purchasing officer, with headquarters at Washington, D. C.

The principal purchases have been made by the Washington office, although offices in charge of assistant purchasing agents have been continued at New York, New Orleans, and San Francisco, these latter offices having also acted as receiving and forwarding agencies for such materials as have been purchased for forwarding to the Isthmus through their respective ports. A small force of employees has been continued in the medical supply depot, United States Army, New York City, for the purpose of assisting the officer in charge in making purchases of medical and hospital supplies for the Isthmus, most of which supplies have been purchased through that depot.

The system established in the past of preliminary inspection of materials purchased has been continued and a corps of inspectors, under the supervision of the inspecting engineer, located at Washington, has been maintained. As heretofore, the work of inspection has been facilitated by assistance rendered by the field officers of the Corps of Engineers and by the Bureau of Standards, the Bureau of Mines, the Bureau of Chemistry, and the Medical Department, the Ordnance Department, the Signal Corps, and the Quartermaster Corps of the United States Army.

No independent inspection forces now remain in the United States, the last force of this character, which had charge of the inspection of the coal-handling plant, having completed its work in November, 1916.

A summary of all the orders placed through the Washington office by fiscal years 1904 to 1915, inclusive, was contained in the report for the fiscal year 1915. In the last annual report a similar summary was given for the fiscal year 1916, and at the same time it was shown that the number of orders issued in that year—the orders placed being the criterion of the amount of clerical work in the Washington office—was greater than ever before. The number of orders issued

during the past fiscal year is slightly greater than in the previous year, as shown by the following comparative table:

Summary of orders placed through the Washington office of The Panama Canal in the fiscal years 1916 and 1917.

Month.	1915-16	1916-17	Month.	1915-16	1916-17
July.....	631	719	February.....	726	845
August.....	710	741	March.....	660	792
September.....	736	737	April.....	683	731
October.....	778	671	May.....	755	708
November.....	752	823	June.....	791	714
December.....	819	754			
January.....	815	655	Total.....	8,856	8,890

The total value of orders placed by the Washington office in the last fiscal year was \$10,403,996.08, as compared with \$8,495,099.59 in 1915-16, making the grand total of purchases since 1904, \$128,563,231.53.

The following is a report, as required by the act of Congress, approved July 1, 1916, showing increases in the Washington office during the fiscal year:

	Increase in pay.		Increase in numbers.		
	Rate authorized in organization, July 1, 1915.	Increased to—	Number authorized in 1917 Book of Estimates.	Increased to—	
Temporary clerks for all offices.	\$2,000.00	\$2,594.17	.....	.....	Excess of \$594.17 due to increased work throughout the whole office.
Clerks, \$1,400, purchasing department.	.....	.....	4	5	1 additional clerk and 1 additional messenger boy required on account of increased work caused by this office mimeographing circulars instead of having them printed in order to reduce printing expense.
Messenger boys, \$600, purchasing department.	.....	.....	4	5	

EARL I. BROWN,

*Lieut. Col., Corps of Engineers, United States Army,
General Purchasing Officer, Chief of Office.*

Col. CHESTER HARDING, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.

APPENDIX L.

ACTS OF CONGRESS AND EXECUTIVE ORDERS RELATING TO THE PANAMA CANAL AND TO THE CANAL ZONE.

INDEX.

Acts of Congress:	Page.
Regulating the immigration of aliens to, and the residence of aliens in, the United States, approved, by passage after veto; by the House of Representatives, February 1, 1917; by the Senate, February 5, 1917....	368
Making appropriations for fortifications and other works of defense, for the armament thereof, for the procurement of heavy ordnance for trial and service, and for other purposes, approved February 14, 1917.....	369
Authorizing the transfer of certain retired Army officers to the active list, approved February 23, 1917.....	369
Making appropriations for the Diplomatic and Consular Service for the fiscal year ending June thirtieth, nineteen hundred and eighteen, approved March 3, 1917.....	369
Making appropriations for the legislative, executive, and judicial expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes, approved March 3, 1917..	370
Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and eighteen, approved March 4, 1917.....	370
Making appropriations for the naval service for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes, approved March 4, 1917.....	371
Making appropriations to supply deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and seventeen, and prior fiscal years, and for other purposes, approved April 17, 1917.....	372
Amending section ten of chapter two of the Criminal Code, approved May 7, 1917.....	373
Authorizing the President to take over for the United States the possession and title of any vessel within its jurisdiction, which at the time of coming therein was owned in whole or in part by any corporation, citizen, or subject of any nation with which the United States may be at war, or was under register of any such nation, and for other purposes, approved May 12, 1917.....	373
Making appropriations for the support of the Army for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes, approved May 12, 1917.....	373
Temporarily increasing the commissioned and warrant and enlisted strength of the Navy and Marine Corps, and for other purposes, approved May 22, 1917.....	374
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ACTS OF CONGRESS AND EXECUTIVE ORDERS RELATING TO THE PANAMA CANAL AND TO THE CANAL ZONE.

An Act To regulate the immigration of aliens to, and the residence of aliens in, the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the word "alien" wherever used in this Act shall include any person not a native-born or naturalized citizen of the United States; but this definition shall not be held to include Indians of the United States not taxed or citizens of the islands under the jurisdiction of the United States. That the term "United States" as used in the title as well as in the various sections of this Act shall be construed to mean the United States, and any waters, territory, or other land subject to the jurisdiction thereof, except the Isthmian Canal Zone; but if any alien shall leave the Canal Zone or any insular possession of the United States and attempt to enter any other place under the jurisdiction of the United States, nothing contained in this Act shall be construed as permitting him to enter under any other conditions than those applicable to all aliens.

* * * * *

Provided further, That whenever the President shall be satisfied that passports issued by any foreign Government to its citizens or subjects to go to any country other than the United States, or to any insular possession of the United States or to the Canal Zone, are being used for the purpose of enabling the holder to come to the continental territory of the United States to the detriment of labor conditions therein, the President shall refuse to permit such citizens or subjects of the country issuing such passports to enter the continental territory of the United States from such other country or from such insular possession or from the Canal Zone.

* * * * *

SEC. 38. That this Act, except as otherwise provided in section three, shall take effect and be enforced on and after May first, nineteen hundred and seventeen.

* * * * *

Passage after veto; by the House of Representatives, February 1, 1917; by the Senate, February 5, 1917. (39 Stat., 874, 878, 897.)

AN ACT Making appropriations for fortifications and other works of defense, for the armament thereof, for the procurement of heavy ordnance for trial and service, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to be immediately available and to continue available until expended, namely:

FORTIFICATIONS AND OTHER WORKS OF DEFENSE.

* * * * *

UNDER THE CHIEF SIGNAL OFFICER.

* * * * *

The Secretary of War is directed to submit to Congress on or before January first, nineteen hundred and eighteen, a detailed statement of the land, buildings, and other facilities now available and to be required for the accommodation of airships and other aerial machines to be used in connection with the seacoast defenses of the continental United States, the insular possessions, and the Panama Canal.

* * * * *

Approved, February 14, 1917. (39 Stat., 909, 910.)



AN ACT Authorizing transfer of certain retired Army officers to the active list.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter the President be, and he is hereby, authorized, within one year of the approval of this Act, by and with the advice and consent of the Senate, to transfer, upon application, to the active list of the Army any officer under fifty years of age who may have been transferred heretofore from the active to the retired list of the Army under the Act to provide for recognizing the services of certain officers of the Army, Navy, and Public Health Service for their services in connection with the construction of the Panama Canal, and for other purposes, approved March fourth, nineteen hundred and fifteen: *Provided,* That such officers shall take rank at the foot of the respective grades which they held at the time of their retirement and shall be carried as an additional number in the grade to which he may be transferred or at any time thereafter promoted, and shall be promoted on the same date as the officer next above him in rank, and shall be commissioned in the arm or department of the Army from which he was retired: *Provided further,* That such officer shall stand a satisfactory medical examination, and when promoted shall stand the medical and professional examinations provided for by law: *And provided further,* That any officer transferred to the active list under this Act shall not again be entitled to the benefits of the Panama Canal Act described above, except when retired for age or for physical disability incurred in the line of duty.

Approved, February 23, 1917 (39 Stat., 937).



AN ACT Making appropriations for the Diplomatic and Consular Service for the fiscal year ending June thirtieth, nineteen hundred and eighteen.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, severally appropriated, in full compensation for the Diplomatic and Consular Service for the fiscal year ending June thirtieth, nineteen hundred and eighteen, out of any money in the Treasury not otherwise appropriated, for the objects hereinafter expressed, namely:

* * * * *

PAYMENT TO THE GOVERNMENT OF PANAMA.

To enable the Secretary of State to pay to the Government of Panama the sixth annual payment due on February twenty-sixth, nineteen hundred and eighteen, from the Government of the United States to the Government of Panama under article fourteen of the treaty of November eighteenth, nineteen hundred and three, \$250,000.

* * * * *

RELIEF AND PROTECTION OF AMERICAN SEAMEN.

Relief and protection of American seamen in foreign countries, and in the Panama Canal Zone, and shipwrecked American seamen in the Territory of Alaska, in the Hawaiian Islands, Porto Rico, and the Philippine Islands, \$40,000.

* * * * *

Approved, March 3, 1917 (39 Stat., 1047, 1055, 1058).

AN ACT Making appropriations for the legislative, executive, and judicial expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes.

* * * * *

Provided, That on and after July first, nineteen hundred and nineteen, no Government official or employee shall receive any salary in connection with his services as such an official or employee from any source other than the Government of the United States, except as may be contributed out of the treasury of any State, county, or municipality, and no person, association, or corporation shall make any contribution to, or in any way supplement the salary of, any Government official or employee for the services performed by him for the Government of the United States. Any person violating any of the terms of this proviso shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than \$1,000 or imprisonment for not less than six months, or by both such fine and imprisonment as the court may determine.

* * * * *

SEC. 4. That no part of any money appropriated by this or any other act shall be used during the fiscal year nineteen hundred and eighteen for the purchase of any typewriting machine at a price in excess of the lowest price paid by the Government of the United States for the same make and substantially the same model of machine during the fiscal year nineteen hundred and sixteen; such price shall include the value of any typewriting machine or machines given in exchange, but shall not apply to special prices granted on typewriting machines used in schools of the District of Columbia or of the Indian Service, the lowest of which special prices paid for typewriting machines shall not be exceeded in future purchases for such schools: *Provided*, That in construing this section the Commissioner of Patents shall advise the Comptroller of the Treasury as to whether the changes in any typewriter are of such structural character as to constitute a new machine not within the limitations of this section.

* * * * *

Approved, March 3, 1917. (39 Stat., 1070, 1106, 1121.)

AN ACT Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and eighteen.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, out of any money in the Treasury of the United States not otherwise appropriated, in full compensation for the fiscal year ending June thirtieth, nineteen hundred and eighteen, for the purposes and objects hereinafter expressed, namely:

DEPARTMENT OF AGRICULTURE.

* * * * *
GENERAL EXPENSES, WEATHER BUREAU: For carrying into effect in the District of Columbia and elsewhere in the United States, in the West Indies, in the Panama Canal, the Caribbean Sea, and on adjacent coasts, in the Hawaiian Islands, in Bermuda, and in Alaska, the provisions of an Act approved October first, eighteen hundred and ninety, so far as they relate to the weather service transferred thereby to the Department of Agriculture,

* * * * *
 Total for Weather Bureau, \$1,783,140.

* * * * *
 Approved, March 4, 1917. (39 Stat., 1134, 1136, 1137.)

AN ACT Making appropriations for the naval service for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, to be paid out of any money in the Treasury not otherwise appropriated, for the naval service of the Government for the year ending June thirtieth, nineteen hundred and eighteen, and for other purposes:

* * * * *
 That in case of national emergency the President is authorized to suspend provisions of law prohibiting more than eight hours labor in any one day of persons engaged upon work covered by contracts with the United States: *Provided further,* That the wages of persons employed upon such contracts shall be computed on a basic day rate of eight hours work, with overtime rates to be paid for at not less than time and one-half for all hours work in excess of eight hours.

NAVAL EMERGENCY FUND.

* * * * *
 (a) That the word "person" as used in paragraphs (b), (c), next hereafter shall include any individual, trustee, firm, association, company, or corporation. The word "ship" shall include any boat, vessel, submarine, or any form of aircraft, and the parts thereof. The words "war material" shall include arms, armament, ammunition, stores, supplies, and equipment for ships and airplanes, and everything required for or in connection with the production thereof. The word "factory" shall include any factory, workshop, engine works, building used for manufacture, assembling, construction, or any process, and any shipyard or dockyard. The words "United States" shall include the Canal Zone and all territory and waters, continental and insular, subject to the jurisdiction of the United States.

(b) That in time of war, or of national emergency arising prior to March first, nineteen hundred and eighteen, to be determined by the President by proclamation, the President is hereby authorized and empowered, in addition to all other existing provisions of law:

First. Within the limits of the amounts appropriated therefor, to place an order with any person for such ships or war material as the necessities of the Government, to be determined by the President, may require and which are of the nature, kind, and quantity usually produced or capable of being produced by such person. Compliance with all such orders shall be obligatory on any person to whom such order is given, and such order shall take precedence over all other orders and contracts theretofore placed with such person. If any person owning, leasing, or operating any factory equipped for the building or production of ships or war material for the Navy shall refuse or fail to give to the United States such preference in the execution of such an order, or shall refuse to build, supply, furnish, or manufacture the kind, quantity, or quality of ships or war material so ordered at such reasonable price as shall be determined by the President, the President may take immediate possession of any factory of such person, or of any part thereof without taking possession of the entire fac-

tory, and may use the same at such times and in such manner as he may consider necessary or expedient.

Second. Within the limit of the amounts appropriated therefor, to modify or cancel any existing contract for the building, production, or purchase of ships or war material; and if any contractor shall refuse or fail to comply with the contract as so modified the President may take immediate possession of any factory of such contractor, or any part thereof without taking possession of the entire factory, and may use the same at such times and in such manner as he may consider necessary or expedient.

Third. To require the owner or occupier of any factory in which ships or war material are built or produced to place at the disposal of the United States the whole or any part of the output of such factory, and, within the limit of the amounts appropriated therefor, to deliver such output or parts thereof in such quantities and at such times as may be specified in the order at such reasonable price as shall be determined by the President.

Fourth. To requisition and take over for use or operation by the Government any factory, or any part thereof without taking possession of the entire factory, whether the United States has or has not any contract or agreement with the owner or occupier of such factory.

That all authority granted to the President in this paragraph, to be exercised in time of national emergency, shall cease on March first, nineteen hundred and eighteen.

(d) That whenever the United States shall cancel or modify any contract, make use of, assume, occupy, requisition, or take over any factory or part thereof, or any ships or war material, in accordance with the provisions of paragraph (b), it shall make just compensation therefor, to be determined by the President, and if the amount thereof so determined by the President is unsatisfactory to the person entitled to receive the same, such person shall be paid fifty per centum of the amount so determined by the President and shall be entitled to sue the United States to recover such further sum as added to said fifty per centum shall make up such amount as will be just compensation therefor, in the manner provided for by section twenty-four, paragraph twenty, and section one hundred and forty-five of the Judicial Code.

* * * * *

That section forty-four of the Act entitled "An Act to codify, revise, and amend the penal laws of the United States," approved March fourth, nineteen hundred and nine, be, and the same is hereby, amended to read as follows:

"Sec. 44. Whoever shall willfully trespass upon, injure, or destroy any of the works or property or material of any submarine mine or torpedo or fortification or harbor-defense system owned or constructed or in process of construction by the United States, or shall willfully interfere with the operation or use of any such submarine mine, torpedo, fortification, or harbor-defense system, or shall knowingly, willfully, or wantonly violate any duly authorized and promulgated order or regulation of the President governing persons or vessels within the limits of defensive sea areas, which defensive sea areas are hereby authorized to be established by order of the President from time to time as may be necessary in his discretion for purposes of national defense, shall be punished on conviction thereof in a district or circuit court of appeals of the United States for the district or circuit in which the offense is committed, or into which the offender is first brought, by a fine of not more than \$5,000, or by imprisonment for a term not exceeding five years, or by both, in the discretion of the court."

* * * * *

Approved, March 4, 1917. (39 Stat., 1168, 1192, 1193.)

AN ACT Making appropriations to supply deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and seventeen, and prior fiscal years, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and seventeen, and prior fiscal years, and for other purposes, namely:

* * * * *

PANAMA CANAL.

For the fortification of the Panama Canal as follows: For the operation and maintenance of fire-control installations at seacoast defenses, Panama Canal, under the Chief Signal Officer of the Army, \$5,000.

* * * * *

Approved, April 17, 1917.

An Act To amend section ten of chapter two of the Criminal Code.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 10 of chapter two of an Act entitled "An Act to codify, revise, and amend the penal laws of the United States," approved March fourth, nineteen hundred and nine, be amended so as to read as follows:

"SEC. 10. Whoever, within the territory or jurisdiction of the United States, enlists or enters himself, or hires or retains another person to enlist or enter himself, or to go beyond the limits or jurisdiction of the United States with intent to be enlisted or entered in the service of any foreign prince, State, colony, district, or people as a soldier or as a marine or seaman on board of any vessel of war, letter of marque, or privateer shall be fined not more than \$1,000 and imprisoned not more than three years: *Provided*, That this section shall not apply to citizens or subjects of any country engaged in war with a country with which the United States is at war, unless such citizen or subject of such foreign country shall hire or solicit a citizen of the United States to enlist or go beyond the jurisdiction of the United States with intent to enlist or enter the service of a foreign country. Enlistments under this proviso shall be under regulations prescribed by the Secretary of War."

Approved, May 7, 1917.

JOINT RESOLUTION Authorizing the President to take over for the United States the possession and title of any vessel within its jurisdiction, which at the time of coming therein was owned in whole or in part by any corporation, citizen, or subject of any nation with which the United States may be at war, or was under register of any such nation, and for other purposes.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the President be, and he is hereby, authorized to take over to the United States the immediate possession and title of any vessel within the jurisdiction thereof, including the Canal Zone and all territories and insular possessions of the United States except the American Virgin Islands, which at the time of coming into such jurisdiction was owned in whole or in part by any corporation, citizen, or subject of any nation with which the United States may be at war when such vessel shall be taken, or was flying the flag of or was under register of any such nation or any political subdivision or municipality thereof; and, through the United States Shipping Board, or any department or agency of the Government, to operate, lease, charter, and equip such vessel in any service of the United States, or in any commerce, foreign or coastwise.

SEC. 2. That the Secretary of the Navy be, and he is hereby, authorized and directed to appoint, subject to the approval of the President, a board of survey, whose duty it shall be to ascertain the actual value of the vessel, its equipment, appurtenances, and all property contained therein, at the time of its taking, and to make a written report of their findings to the Secretary of the Navy, who shall preserve such report with the records of his department. These findings shall be considered as competent evidence in all proceedings on any claim for compensation.

Approved, May 12, 1917.

AN ACT Making appropriations for the support of the Army for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, out of any money in the Treasury not otherwise appropriated, for the support of the Army for the year ending June thirtieth, nineteen hundred and eighteen:

* * * * *

MEDICAL DEPARTMENT.

MEDICAL AND HOSPITAL DEPARTMENT: For the purchase of medical and hospital supplies, including motor ambulances, and motorcycles for medical service, their maintenance, repair, and operation, and disinfectants, and the purchase and exchange of typewriting machines for military posts, camps, hospitals, hospital ships and transports, and supplies required for mosquito destruction in and about military posts in the Canal Zone: * * * \$1,000,000.

HOSPITAL CARE, CANAL ZONE GARRISONS: For paying the Panama Canal such reasonable charges, exclusive of subsistence, as may be approved by the Secretary of War for caring in its hospitals for officers, enlisted men, military prisoners and civilian employees of the Army admitted thereto upon the request of proper military authority: *Provided*, That the subsistence of the said patients, except commissioned officers, shall be paid to said hospitals out of the appropriation for subsistence of the Army at the rates provided therein for commutation of rations for enlisted patients in general hospitals, \$35,000.

* * * * *

RESERVE CORPS.

* * * * *

Provided further, That all officers and employees of the United States or of the District of Columbia who shall be members of the Officers' Reserve Corps shall be entitled to leave of absence from their respective duties, without loss of pay, time, or efficiency rating, on all days during which they shall be ordered to duty with troops or at field exercises, or for instruction, for periods not to exceed fifteen days in any one calendar year.

Provided further, That members of the Officers' Reserve Corps who are in the employ of the United States Government or of the District of Columbia and who are ordered to duty by proper authority shall, when relieved from duty, be restored to the positions held by them when ordered to duty.

* * * * *

Approved, May 12, 1917.

AN ACT To temporarily increase the commissioned and warrant and enlisted strength of the Navy and Marine Corps, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

* * * * *

SEC. 19. That section forty-four of the Act entitled "An Act to codify, revise, and amend the penal laws of the United States," approved March fourth, nineteen hundred and nine, as amended by an Act entitled "An Act making appropriation for the naval service for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes," approved March fourth, nineteen hundred and seventeen, be, and is hereby, amended by adding the following to said section:

"Provided, That offenses hereunder committed within the Canal Zone or within any defensive sea areas which the President is authorized to establish by said section, shall be cognizable in the District Court of the Canal Zone, and jurisdiction is hereby conferred upon said court to hear and determine all such cases arising under said section and to impose the penalties therein provided for the violation of any of the provisions of said section."

* * * * *

Approved, May 22, 1917.

(NOTE: The section referred to will be found on page 147.)

AN ACT Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, for the fiscal year ending June thirtieth, nineteen hundred and eighteen, namely:

* * * * *

WAR DEPARTMENT.

* * * * *

NATIONAL CEMETERIES.

* * * * *

Disposition of remains of officers, soldiers, civilian employees, and so forth: For interment, or of preparation and transportation to their homes or to such national cemeteries as may be designated by proper authority, in the discretion of the Secretary of War, of the remains of officers, including acting assistant surgeons and enlisted men of the Army active list; interment, or of preparation and transportation to their homes, of the remains of civil employees of the Army in the employ of the War Department who die abroad, in Alaska, in the Canal Zone, or on Army transports, or who die while on duty in the field or at military posts within the limits of the United States; interment of military prisoners who die at military posts; removal of remains from abandoned posts to permanent military posts or national cemeteries, including the remains of Federal soldiers, sailors, or marines, interred in fields or abandoned private and city cemeteries; and in any case where the expenses of burial or shipment of the remains of officers or enlisted men of the Army who die on the active list are borne by individuals, where such expenses would have been lawful claims against the Government, reimbursement to such individuals may be made of the amount allowed by the Government for such services out of this sum, but no reimbursement shall be made of such expenses incurred prior to July first, nineteen hundred and ten, \$60,000.

* * * * *

DEPARTMENT OF COMMERCE.

* * * * *

COAST AND GEODETIC SURVEY.

* * * * *

Field expenses: For surveys and necessary resurveys of the Atlantic and Gulf coasts of the United States, including the coasts of outlying islands under the jurisdiction of the United States: *Provided*, That not more than \$25,000 of this amount shall be expended on the coasts of said outlying islands, and the Atlantic entrance to the Panama Canal, \$115,000;

* * * * *

THE PANAMA CANAL.

For every expenditure requisite for and incident to the construction, maintenance and operation, sanitation, and civil government of the Panama Canal and Canal Zone, including the following: Compensation of all officials and employees; foreign and domestic newspapers and periodicals; law books not exceeding \$500. textbooks and books of reference; printing and binding, including printing of annual report, rents and personal services in the District of Columbia; purchase or exchange of typewriting, adding, and other machines; purchase or exchange, maintenance, repair, and operation of motor-propelled and horse-drawn passenger-carrying vehicles; claims for damages to vessels passing through the locks of the Panama Canal, as authorized by the Panama Canal Act; claims for losses of or damages to property arising from the conduct of authorized business operations; claims for damages caused to owners of private lands or private property of any kind by reason of the grants contained in the treaty between the United States and the Republic of Panama, proclaimed February twenty-sixth, nineteen hundred and four, or by reason of the operations of the United States, its agents or employees, or by reason of the construction, maintenance, operation, sanitation, and protection of the said canal or of the work of sanitation and protection therein provided for, whether such claims are compromised by agreements between the claimants and the Governor of the Panama Canal or allowed by a joint land commission; acquisition of land and land under water, as authorized in the Panama Canal Act; expenses incurred in assembling, assorting, storing, repairing, and selling material, machinery, and equipment heretofore or hereafter purchased or acquired for the construction of the Panama Canal which are unserviceable or no longer needed, to be reimbursed from the proceeds of such sales; expenses incident to conducting hearings and examining

estimates for appropriations on the Isthmus; expenses incident to any emergency arising because of calamity by flood, fire, pestilence, or like character not foreseen or otherwise provided for herein; per diem allowance in lieu of subsistence when prescribed by the Governor of the Panama Canal, to persons engaged in field work or traveling on official business, pursuant to section thirteen of the sundry civil appropriation Act approved August first, nineteen hundred and fourteen, and for such other expenses not in the United States as the Governor of the Panama Canal may deem necessary to best promote the construction, maintenance and operation, sanitation, and civil government of the Panama Canal, all to be expended under the direction of the Governor of the Panama Canal and accounted for as follows:

For continuing the construction and equipment of the Panama Canal, including \$1,000 additional compensation to the Auditor for the War Department for extra services in auditing accounts for the Panama Canal; for the completion of one dock at Cristobal (numbered six) at a total cost not exceeding \$1,500,000; and toward construction by contract or in navy yards complete in every detail of two sea-going coal barges at a total cost not exceeding \$800,000 each under a contract or contracts hereby authorized therefor: *Provided*, That the authority contained in the Act approved July first, nineteen hundred and sixteen, for the construction of two colliers is repealed and the sum of \$1,100,000 appropriated therein toward the construction of the said colliers, or so much thereof as is unexpended, is made available for use in the construction of the coal barges authorized herein, \$2,755,000.

For maintenance and operation of the Panama Canal, salary of the governor, \$100,000;¹ purchase, inspection, delivery, handling, and storing of material, supplies and equipment for issue to all departments of the Panama Canal, the Panama Railroad, other branches of the United States Government, and for authorized sales, payment in lump sums of not exceeding the amounts authorized by the injury compensation Act approved September seventh, nineteen hundred and sixteen, to alien cripples who are now a charge upon the Panama Canal by reason of injuries sustained while employed in the construction of the Panama Canal, \$9,000,000, together with all moneys arising from the conduct of business operations authorized by the Panama Canal Act;

For sanitation, quarantine, hospitals, and medical aid and support of the insane and of lepers, and aid and support of indigent persons legally within the Canal Zone, including expenses of their deportation when practicable, and including additional compensation from May tenth, nineteen hundred and sixteen, to any officer of the United States Public Health Service detailed with the Panama Canal as chief quarantine officer, \$700,000;

For civil government of the Panama Canal and Canal Zone, salaries of district judge \$6,000, district attorney, \$5,000, marshal \$5,000, and for gratuities and necessary clothing for indigent discharged prisoners, \$700,000;

In all, \$13,155,000, to be immediately available and to continue available until expended: *Provided*, That all expenditures from the appropriations heretofore, herein, and hereafter made for the construction of the Panama Canal, including any portion of such appropriations which may be used for the construction of dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances, for the purpose of providing coal and other materials, labor, repairs, and supplies, for the construction of office buildings and quarters, and other necessary buildings, exclusive of fortifications, colliers, dock six at Cristobal, coal barges, and repairs, alterations, and reboiling of steamships Ancon and Cristobal, and exclusive of the fair value of the American Legation building in Panama, as approved by the Secretary of War and Secretary of State, and exclusive of the amount used for operating and maintaining the canal, and exclusive of the amount expended for sanitation and civil government after January first, nineteen hundred and fifteen, may be paid from or reimbursed to the Treasury of the United States out of the proceeds of the sale of bonds authorized in section eight of the said Act approved June twenty-eighth, nineteen hundred and two, and section thirty-nine of the tariff Act approved August fifth, nineteen hundred and nine.

Except in cases of emergency, or conditions arising subsequent to and unforeseen at the time of submitting the annual estimates to Congress, and except for those employed in connection with the construction of permanent quarters, offices, and other necessary buildings, dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurte-

¹ Later amended to read \$10,000; see page 391.

nances for the purpose of providing coal and other materials, labor, repairs, and supplies, and except for the permanent operating organization under which the compensation of the various positions is limited by section four of the Panama Canal Act, there shall not be employed at any time during the fiscal year nineteen hundred and eighteen under any of the foregoing appropriations for the Panama Canal, any greater number of persons than are specified in the notes submitted respectively in connection with the estimates for each of said appropriations in the annual Book of Estimates for said year, nor shall there be paid to any such person during that fiscal year any greater rate of compensation than was authorized to be paid to persons occupying the same or like positions on the first day of July, nineteen hundred and sixteen; and all employments made or compensation increased because of emergencies or conditions so arising shall be specifically set forth, with the reasons therefor, by the governor in his report for the fiscal year nineteen hundred and eighteen.

In addition to the foregoing sums there is appropriated, for the fiscal year nineteen hundred and eighteen, for expenditure and reinvestment under the several heads of appropriation aforesaid without being covered into the Treasury of the United States, all moneys received by the Panama Canal from services rendered or materials and supplies furnished to the United States, the Panama Railroad Company, the Canal Zone government, or to their employees, respectively, or to the Panama Government, from hotel and hospital supplies and services; from rentals, wharfage, and like services; from labor, materials, and supplies and other services furnished to vessels other than those passing through the canal, and to others unable to obtain the same elsewhere; from the sale of scrap and other by-products of manufacturing and shop operations; from the sale of obsolete and unserviceable materials, supplies, and equipment purchased or acquired for the operation, maintenance, protection, sanitation, and government of the canal and Canal Zone; and any net profits accruing from such business to the Panama Canal shall annually be covered into the Treasury of the United States.

In addition there is appropriated for the operation, maintenance, and extension of waterworks, sewers, and pavements in the cities of Panama and Colon, during the fiscal year nineteen hundred and eighteen, the necessary portions of such sums as shall be paid as water rentals or directly by the Government of Panama for such expenses.

In addition to the foregoing amounts there is appropriated, out of any money hereafter received as tolls, before such money is covered into the Treasury as miscellaneous receipts, amounts necessary to refund to the parties entitled thereto amounts which heretofore or may hereafter be erroneously received as tolls and covered into the Treasury as miscellaneous receipts.

Upon the application of the governor of the Panama Canal the Secretary of the Interior is authorized to transfer to Saint Elizabeths Hospital, in the District of Columbia, for treatment all American citizens legally adjudged insane in the Canal Zone whose legal residence in one of the States and Territories or the District of Columbia it has been impossible to establish. Upon the ascertainment of the legal residence of persons so transferred to the hospital, the superintendent of the hospital shall thereupon transfer such persons to their respective places of residence, and the expenses attendant thereon shall be paid from the appropriation for the support of the hospital.

FORTIFICATIONS, PANAMA CANAL.

For fortifications and armament thereof for the Panama Canal, to be immediately available and to continue available until expended, namely:

For maintenance of clearings and trails, \$20,000;

For protection, preservation, and repair of fortifications, including structures erected for torpedo defense, and for maintaining channels for access to torpedo wharves, \$10,000;

For maintenance and repair of searchlights and electric light and power equipment for fortifications, and for tools, electrical and other supplies, and appliances to be used in their operation, \$7,500;

For the construction of seacoast batteries, \$332,000;

Submarine base (Coco Solo Point): For dredging inner basin and channel to same, concrete dock, containing walls, finger docks, tracks, dry fill, electrical work, shops, storehouses, stationary crane, magazines and torpedo storage, shop and power tools; and plant equipment, \$750,000: *Provided*, That the construc-

tion work hereunder shall be performed under the direction of the governor of the Panama Canal;

For the construction and development of an aeronautic station on the Canal Zone, \$250,000;

For alteration, maintenance, and repair of submarine mine matériel, \$2,500;

For operation and maintenance of fire-control installations at seacoast defenses, \$10,000;

For the purchase, manufacture, maintenance, operation, and repair of airships and other aerial machines, buildings for equipment, and other accessories necessary in the aviation section for use in connection with the seacoast defenses of the Panama Canal, \$500,000: *Provided*, That the construction of buildings hereunder shall be performed under the direction of the Governor of the Panama Canal;

For the purchase, manufacture, and test of seacoast cannon for coast defense, including their carriages, sights, implements, equipments, and the machinery necessary for their manufacture at the arsenals, \$468,000;

For the purchase, manufacture, and test of ammunition for seacoast and land defense cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture at the arsenals, \$1,985,000: *Provided*, That the Chief of Ordnance, United States Army, is authorized to enter into contracts or otherwise incur obligations for the purposes above mentioned not to exceed \$700,000 in addition to the appropriations herein and heretofore made;

For the alteration, maintenance, and installation of the seacoast artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work, and expenses of civilian mechanics, and extra-duty pay of enlisted men engaged thereon, \$335,000;

Ordnance Depot: For a building for storing artillery vehicles, \$8,500;

For necessary equipment, including machinery and its installation, for the ordnance repair shops, \$40,000;

For two magazines, \$34,000;

For a building for storing lumber, targets, and so forth, \$4,000;

The appropriations of \$160,000 for one dock and \$100,000 for necessary dredging for the Ordnance Depot for the Panama Canal, contained in the general deficiency appropriation Act, approved September eighth, nineteen hundred and sixteen, are repealed;

In all, \$86,500;

In all, specifically for fortifications and armament thereof for the Panama Canal, \$4,756,500.

Provided, That no part of the appropriations made in this Act shall be available for the salary or pay of any officer, manager, superintendent, foreman, or other person having charge of the work of any employee of the United States while making or causing to be made with a stop watch, or other time-measuring device, a time study of any job of any such employee between the starting and completion thereof, or of the movements of any such employee while engaged upon such works; nor shall any part of the appropriations made in this Act be available to pay any premium or bonus or cash reward to any employee in addition to his regular wages, except for suggestions resulting in improvements or economy in the operation of any Government plant.

SEC. 2. That to provide, during the fiscal year nineteen hundred and eighteen, for increased compensation at the rate of ten per centum per annum to employees who receive salaries at a rate per annum less than \$1,200, and for increased compensation at the rate of five per centum per annum to employees who receive salaries at a rate not more than \$1,800 per annum and not less than \$1,200 per annum, so much as may be necessary is appropriated: *Provided*, That this section shall only apply to the employees who are appropriated for in this Act specifically and under lump sums or whose employment is authorized herein, but shall not include employees of the Panama Canal on the Canal Zone: *Provided further*, That detailed reports shall be submitted to Congress on the first day of the next session showing the number of persons, the grades or character of positions, the original rates of compensation, and the increased rates of compensation provided for herein.

SEC. 3. That all sums appropriated by this act for salaries of officers and employees of the Government shall be in full for such salaries for the fiscal year nineteen hundred and eighteen, and all laws or parts of laws to the extent they are in conflict with the provisions of this Act are repealed.

Approved, June 12, 1917.

AN ACT Making appropriations to supply urgent deficiencies in appropriations for the Military and Naval Establishments on account of war expenses for the fiscal year ending June thirtieth, nineteen hundred and seventeen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply urgent deficiencies in appropriations for the Military and Naval Establishments on account of war expenses for the fiscal year ending June thirtieth, nineteen hundred and seventeen, and for other purposes, namely:

* * * * *

MILITARY ESTABLISHMENT.

* * * * *

MEDICAL DEPARTMENT.

MEDICAL AND HOSPITAL DEPARTMENT: For the purchase of medical and hospital supplies, including gas masks, motor ambulances, and motorcycles for medical service, their maintenance, repair, and operation, and disinfectants, and the purchase and exchange of typewriting machines for military posts, camps, hospitals, hospital ships and transports, and supplies required for mosquito destruction in and about the military posts in the Canal Zone * * * \$29,780,000.

* * * * *

PANAMA CANAL FORTIFICATIONS.

For fortifications and armament thereof for the Panama Canal, namely:

For the construction of seacoast batteries on the Canal Zone, \$5,000;

For land defenses, Panama Canal, including the procurement and installation of searchlights, purchase of armored cars and locomotives, construction of roads and surveys incidental thereto, \$29,500;

For the purchase and installation of electric light and power plants for the seacoast fortifications on the Canal Zone, \$55,000;

For the purchase and installation of searchlights for the seacoast fortifications on the Canal Zone, \$78,774;

For the purchase, manufacture, and test of seacoast cannon for coast defense, including their carriages, sights, implements, equipments, and the machinery necessary for their manufacture at the arsenals, \$1,775,000;

For the purchase, manufacture, and test of ammunition for seacoast and land-defense cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture at the arsenals, \$1,415,000;

For alteration, maintenance, and installation of the seacoast artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work, and expenses of civilian mechanics, and extra-duty pay of enlisted men engaged thereon, \$665,000;

For the purchase of submarine mines and nets and the necessary appliances to operate them for closing the channels leading to the Panama Canal, \$250,000;

For alteration, maintenance, and repair of submarine mine matériel, \$47,500;

Ordnance depot, Panama Canal: For an additional amount for a building for storing lumber, targets, and so forth, \$200;

In all, specifically for fortifications and armament thereof for the Panama Canal, \$4,320,974.

* * * * *

SEC. 2. That the appropriations contained in this Act, unless otherwise specified herein, shall be available during the fiscal years nineteen hundred and seventeen and nineteen hundred and eighteen.

SEC. 3. That the appropriations contained herein shall be available for the payment of obligations on account of the existing emergency incurred prior to the passage of this Act and which are properly chargeable to such appropriations.

SEC. 4. That the service of all persons selected by draft and all enlistments under the provisions of the Act entitled "An Act to authorize the President to increase temporarily the Military Establishment of the United States," approved May eighteenth, nineteen hundred and seventeen, shall be for the period of the war, unless sooner terminated by discharge or otherwise. Whenever said war shall cease by the conclusion of peace between the United States and

its enemies in the present war, the President shall so declare by a public proclamation to that effect, and within four months after the date of said proclamation or as soon thereafter as it may be practicable to transport the forces then serving without the United States to their home station, the provisions of said Act, in so far as they authorize compulsory service by selective draft or otherwise, shall cease to be of force and effect.

SEC. 5. That, in addition to the reports now required by law, the Secretaries of the Treasury, War, and Navy shall each on the first Monday in December, nineteen hundred and seventeen, and annually thereafter, transmit to the Congress a detailed statement of all expenditures under this Act.

Approved June 15, 1917.

AN ACT To punish acts of interference with the foreign relations, the neutrality, and the foreign commerce of the United States, to punish espionage, and better to enforce the criminal laws of the United States, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

TITLE I.

ESPIONAGE.

SECTION 1. That (a) whoever, for the purpose of obtaining information respecting the national defense with intent or reason to believe that the information to be obtained is to be used to the injury of the United States, or to the advantage of any foreign nation, goes upon, enters, flies over, or otherwise obtains information concerning any vessel, aircraft, work of defense, navy yard, naval station, submarine base, coaling station, fort, battery, torpedo station, dockyard, canal, railroad, arsenal, camp, factory, mine, telegraph, telephone, wireless, or signal station, building, office, or other place connected with the national defense, owned or constructed, or in progress of construction by the United States or under the control of the United States or of any of its officers or agents, or within the exclusive jurisdiction of the United States, or any place in which any vessel, aircraft, arms, munitions, or other materials or instruments for use in time of war are being made, prepared, repaired, or stored, under any contract or agreement with the United States, or with any person on behalf of the United States, or otherwise on behalf of the United States, or any prohibited place within the meaning of section six of this title; or (b) whoever for the purpose aforesaid, and with like intent or reason to believe, copies, takes, makes, or obtains, or attempts, or induces or aids another to copy, take, make, or obtain, any sketch, photograph, photographic negative, blue print, plan, map, model, instrument, appliance, document, writing, or note of anything connected with the national defense; or (c) whoever, for the purpose aforesaid, receives or obtains or agrees or attempts or induces or aids another to receive or obtain from any person, or from any source whatever, any document, writing, code book, signal book, sketch, photograph, photographic negative, blue print, plan, map, model, instrument, appliance, or note, of anything connected with the national defense, knowing or having reason to believe, at the time he receives or obtains, or agrees or attempts or induces or aids another to receive or obtain it, that it has been or will be obtained, taken, made or disposed of by any person contrary to the provisions of this title; or (d) whoever, lawfully or unlawfully having possession of, access to, control over, or being intrusted with any document, writing, code book, signal book, sketch, photograph, photographic negative, blue print, plan, map, model, instrument, appliance, or note relating to the national defense, willfully communicates or transmits or attempts to communicate or transmit the same to any person not entitled to receive it, or willfully retains the same and fails to deliver it on demand to the officer or employee of the United States entitled to receive it; or (e) whoever, being intrusted with or having lawful possession or control of any document, writing, code book, signal book, sketch, photograph, photographic negative, blue print, plan, map, model, note, or information, relating to the national defense, through gross negligence permits the same to be removed from its proper place of custody or delivered to anyone in violation of his trust, or to be lost, stolen, abstracted, or destroyed, shall be punished by a fine of not more than \$10,000, or by imprisonment for not more than two years, or both.

SEC. 2. (a) Whoever, with intent or reason to believe that it is to be used to the injury of the United States or to the advantage of a foreign nation, communicates, delivers, or transmits, or attempts to, or aids or induces another to, communicate, deliver, or transmit, to any foreign government, or to any faction or party or military or naval force within a foreign country, whether recognized or unrecognized by the United States, or to any representative, officer, agent, employee, subject, or citizen thereof, either directly or indirectly, any document, writing, code book, signal book, sketch, photograph, photographic negative, blue print, plan, map, model, note, instrument, appliance, or information relating to the national defense, shall be punished by imprisonment for not more than twenty years: *Provided*, That whoever shall violate the provisions of subsection (a) of this section in time of war shall be punished by death or by imprisonment for not more than thirty years; and (b) whoever, in time of war, with intent that the same shall be communicated to the enemy, shall collect, record, publish, or communicate, or attempt to elicit any information with respect to the movement, numbers, description, condition, or disposition of any of the armed forces, ships, aircraft, or war materials of the United States, or with respect to the plans or conduct, or supposed plans or conduct of any naval or military operations, or with respect to any works or measures undertaken for or connected with, or intended for the fortification or defense of any place, or any other information relating to the public defense, which might be useful to the enemy, shall be punished by death or by imprisonment for not more than thirty years.

SEC. 3. Whoever, when the United States is at war, shall willfully make or convey false reports or false statements with intent to interfere with the operation or success of the military or naval forces of the United States or to promote the success of its enemies and whoever, when the United States is at war, shall willfully cause or attempt to cause insubordination, disloyalty, mutiny, or refusal of duty in the military or naval forces of the United States, or shall willfully obstruct the recruiting or enlistment service of the United States, to the injury of the service or of the United States, shall be punished by a fine of not more than \$10,000 or imprisonment for not more than twenty years, or both.

SEC. 4. If two or more persons conspire to violate the provisions of sections two or three of this title, and one or more of such persons does any act to effect the object of the conspiracy, each of the parties to such conspiracy shall be punished as in said sections provided in the case of the doing of the act the accomplishment of which is the object of such conspiracy. Except as above provided conspiracies to commit offenses under this title shall be punished as provided by section thirty-seven of the Act to codify, revise, and amend the penal laws of the United States approved March fourth, nineteen hundred and nine.

SEC. 5. Whoever harbors or conceals any person who he knows, or has reasonable grounds to believe or suspect, has committed, or is about to commit, an offense under this title shall be punished by a fine of not more than \$10,000 or by imprisonment for not more than two years, or both.

SEC. 6. The President in time of war or in case of national emergency may by proclamation designate any place other than those set forth in subsection (a) of section one hereof in which anything for the use of the Army or Navy is being prepared or constructed or stored as a prohibited place for the purposes of this title: *Provided*, That he shall determine that information with respect thereto would be prejudicial to the national defense.

SEC. 7. Nothing contained in this title shall be deemed to limit the jurisdiction of the general courts-martial, military commissions, or naval courts-martial under sections thirteen hundred and forty-two, thirteen hundred and forty-three, and sixteen hundred and twenty-four of the Revised Statutes as amended.

SEC. 8. The provisions of this title shall extend to all Territories, possessions, and places subject to the jurisdiction of the United States whether or not contiguous thereto, and offenses under this title when committed upon the high seas or elsewhere within the admiralty and maritime jurisdiction of the United States and outside the territorial limits thereof shall be punishable hereunder.

SEC. 9. The Act entitled "An Act to prevent the disclosure of national defense secrets," approved March third, nineteen hundred and eleven, is hereby repealed.

TITLE II.

VESSELS IN PORTS OF THE UNITED STATES.

SECTION 1. Whenever the President by proclamation or Executive order declares a national emergency to exist by reason of actual or threatened war, insurrection, or invasion, or disturbance or threatened disturbance of the international relations of the United States, the Secretary of the Treasury may make, subject to the approval of the President, rules and regulations governing the anchorage and movement of any vessel, foreign or domestic, in the territorial waters of the United States, may inspect such vessel at any time, place guards thereon, and, if necessary in his opinion in order to secure such vessels from damage or injury, or to prevent damage or injury to any harbor or waters of the United States, or to secure the observance of the rights and obligations of the United States, may take, by and with the consent of the President, for such purposes, full possession and control of such vessel and remove therefrom the officers and crew thereof and all other persons not specially authorized by him to go or remain on board thereof.

Within the territory and waters of the Canal Zone the Governor of the Panama Canal, with the approval of the President, shall exercise all the powers conferred by this section on the Secretary of the Treasury.

SEC. 2. If any owner, agent, master, officer, or person in charge, or any member of the crew of any such vessel fails to comply with any regulation or rule issued or order given by the Secretary of the Treasury or the Governor of the Panama Canal under the provisions of this title, or obstructs or interferes with the exercise of any power conferred by this title, the vessel, together with her tackle, apparel, furniture, and equipment, shall be subject to seizure and forfeiture to the United States in the same manner as merchandise is forfeited for violation of the customs revenue laws; and the person guilty of such failure, obstruction, or interference shall be fined not more than \$10,000, or imprisoned not more than two years, or both.

SEC. 3. It shall be unlawful for the owner or master or any other person in charge or command of any private vessel, foreign or domestic, or for any member of the crew or other person, within the territorial waters of the United States, willfully to cause or permit the destruction or injury of such vessel or knowingly to permit said vessel to be used as a place of resort for any person conspiring with another or preparing to commit any offense against the United States, or in violation of the treaties of the United States or of the obligations of the United States under the law of nations, or to defraud the United States, or knowingly to permit such vessels to be used in violation of the rights and obligations of the United States under the law of nations; and in case such vessel shall be so used, with the knowledge of the owner or master or other person in charge or command thereof, the vessel, together with her tackle, apparel, furniture, and equipment, shall be subject to seizure and forfeiture to the United States in the same manner as merchandise is forfeited for violation of the customs revenue laws; and whoever violates this section shall be fined not more than \$10,000 or imprisoned not more than two years, or both.

SEC. 4. The President may employ such part of the land or naval forces of the United States as he may deem necessary to carry out the purpose of this title.

TITLE III.

INJURING VESSELS ENGAGED IN FOREIGN COMMERCE.

SECTION 1. Whoever shall set fire to any vessel of foreign registry, or any vessel of American registry entitled to engage in commerce with foreign nations, or to any vessel of the United States as defined in section three hundred and ten of the Act of March fourth, nineteen hundred and nine, entitled "An Act to codify, revise, and amend the penal laws of the United States," or to the cargo of the same, or shall tamper with the motive power or instrumentalities of navigation of such vessel, or shall place bombs or explosives in or upon such vessel, or shall do any other act to or upon such vessel while within the jurisdiction of the United States, or, if such vessel is of American registry, while she is on the high sea, with intent to injure or endanger the safety of the vessel or of her cargo, or of persons on board, whether the injury or danger is so intended to take place within the jurisdiction of the United States, or after

the vessel shall have departed therefrom; or whoever shall attempt or conspire to do any such acts with such intent, shall be fined not more than \$10,000 or imprisoned not more than twenty years, or both.

TITLE IV.

INTERFERENCE WITH FOREIGN COMMERCE BY VIOLENT MEANS.

SECTION 1. Whoever, with intent to prevent, interfere with, or obstruct or attempt to prevent, interfere with, or obstruct the exportation to foreign countries of articles from the United States shall injure or destroy, by fire or explosives, such articles or the places where they may be while in such foreign commerce, shall be fined not more than \$10,000, or imprisoned not more than ten years, or both.

TITLE V.

ENFORCEMENT OF NEUTRALITY.

SECTION 1. During a war in which the United States is a neutral nation, the President, or any person thereunto authorized by him, may withhold clearance from or to any vessel, domestic or foreign, which is required by law to secure clearance before departing from port or from the jurisdiction of the United States, or, by service of formal notice upon the owner, master, or person in command or having charge of any domestic vessel not required by law to secure clearances before so departing, to forbid its departure from port or from the jurisdiction of the United States, whenever there is reasonable cause to believe that any such vessel, domestic or foreign, whether requiring clearance or not, is about to carry fuel, arms, ammunition, men, supplies, dispatches, or information to any warship, tender, or supply ship of a foreign belligerent nation in violation of the laws, treaties, or obligations of the United States under the law of nations; and it shall thereupon be unlawful for such vessel to depart.

SEC. 2. During a war in which the United States is a neutral nation, the President, or any person thereunto authorized by him, may detain any armed vessel owned wholly or in part by American citizens, or any vessel, domestic or foreign (other than one which has entered the ports of the United States as a public vessel), which is manifestly built for warlike purposes or has been converted or adapted from a private vessel to one suitable for warlike use, until the owner or master, or person having charge of such vessel, shall furnish proof satisfactory to the President, or to the person duly authorized by him, that the vessel will not be employed by the said owners, or master, or person having charge thereof, to cruise against or commit or attempt to commit hostilities upon the subjects, citizens, or property of any foreign prince or state, or of any colony, district, or people with which the United States is at peace, and that the said vessel will not be sold or delivered to any belligerent nation, or to an agent, officer, or citizen of such nation, by them or any of them, within the jurisdiction of the United States, or, having left that jurisdiction, upon the high seas.

SEC. 3. During a war in which the United States is a neutral nation, it shall be unlawful to send out of the jurisdiction of the United States any vessel built, armed, or equipped as a vessel of war, or converted from a private vessel into a vessel of war, with any intent or under any agreement or contract, written or oral, that such vessel shall be delivered to a belligerent nation, or to an agent, officer, or citizen of such nation, or with reasonable cause to believe that the said vessel shall or will be employed in the service of any such belligerent nation after its departure from the jurisdiction of the United States.

SEC. 4. During a war in which the United States is a neutral nation, in addition to the facts required by sections forty-one hundred and ninety-seven, forty-one hundred and ninety-eight, and forty-two hundred of the Revised Statutes to be set out in the masters' and shippers' manifests before clearance will be issued to vessels bound to foreign ports, each of which sections of the Revised Statutes is hereby declared to be and is continued in full force and effect, every master or person having charge or command of any vessel, domestic or foreign, whether requiring clearance or not, before departure of such vessel from port shall deliver to the collector of customs for the district wherein such vessel is then located a statement duly verified by oath, that the cargo or any part of the cargo is or is not to be delivered to other vessels in port or to be

transshipped on the high seas and, if it is to be so delivered or transshipped, stating the kind and quantities and the value of the total quantity of each kind of article so to be delivered or transshipped, and the name of the person, corporation, vessel, or government, to whom the delivery or transshipment is to be made; and the owners, shippers, or consignors of the cargo of such vessel shall in the same manner and under the same conditions deliver to the collector like statements under oath as to the cargo or the parts thereof laden or shipped by them, respectively.

SEC. 5. Whenever it appears that the vessel is not entitled to clearance or whenever there is reasonable cause to believe that the additional statements under oath required in the foregoing section are false, the collector of customs for the district in which the vessel is located may, subject to review by the Secretary of Commerce, refuse clearance to any vessel, domestic or foreign, and by formal notice served upon the owners, master, or person or persons in command or charge of any domestic vessel for which clearance is not required by law, forbid the departure of the vessel from the port or from the jurisdiction of the United States; and it shall thereupon be unlawful for the vessel to depart.

SEC. 6. Whoever, in violation of any of the provisions of this title, shall take, or attempt or conspire to take, or authorize the taking of any such vessel, out of port or from the jurisdiction of the United States, shall be fined not more than \$10,000 or imprisoned not more than five years, or both; and, in addition, such vessel, her tackle, apparel, furniture, equipment, and her cargo shall be forfeited to the United States.

SEC. 7. Whoever, being a person belonging to the armed land or naval forces of a belligerent nation or belligerent faction of any nation and being interned in the United States, in accordance with the law of nations, shall leave or attempt to leave said jurisdiction, or shall leave or attempt to leave the limits of internment in which freedom of movement has been allowed, without permission from the proper official of the United States in charge, or shall willfully overstay a leave of absence granted by such official, shall be subject to arrest by any marshal or deputy marshal of the United States, or by the military or naval authorities thereof, and shall be returned to the place of internment and there confined and safely kept for such period of time as the official of the United States in charge shall direct; and whoever, within the jurisdiction of the United States and subject thereto, shall aid or entice any interned person to escape or attempt to escape from the jurisdiction of the United States, or from the limits of internment prescribed, shall be fined not more than \$1,000 or imprisoned not more than one year, or both.

SEC. 8. Section thirteen of the Act entitled "An Act to codify, revise, and amend the penal laws of the United States," approved March fourth, nineteen hundred and nine, is hereby amended so as to read as follows:

"SEC. 13. Whoever, within the territory or jurisdiction of the United States or of any of its possessions, knowingly begins or sets on foot or provides or prepares a means for or furnishes the money for, or who takes part in, any military or naval expedition or enterprise to be carried on from thence against the territory or dominion of any foreign prince or state, or of any colony, district, or people with whom the United States is at peace, shall be fined not more than \$3,000 or imprisoned not more than three years, or both."

SEC. 9. That the President may employ such part of the land or naval forces of the United States as he may deem necessary to carry out the purposes of this title.

SEC. 10. Section fifteen of the Act entitled "An Act to codify, revise, and amend the penal laws of the United States," approved March fourth, nineteen hundred and nine, is hereby amended so as to read as follows:

"SEC. 15. It shall be lawful for the President to employ such part of the land or naval forces of the United States, or of the militia thereof, as he may deem necessary to compel any foreign vessel to depart from the United States or any of its possessions in all cases in which, by the law of nations or the treaties of the United States, it ought not to remain, and to detain or prevent any foreign vessel from so departing in all cases in which, by the law of nations or the treaties of the United States, it is not entitled to depart."

SEC. 11. The joint resolution approved March fourth, nineteen hundred and fifteen, "To empower the President to better enforce and maintain the neutrality of the United States," and any Act or parts of Acts in conflict with the provisions of this title are hereby repealed.

TITLE VI.

SEIZURE OF ARMS AND OTHER ARTICLES INTENDED FOR EXPORT.

SECTION 1. Whenever an attempt is made to export or ship from or take out of the United States, any arms or munitions of war, or other articles, in violation of law, or whenever there shall be known or probable cause to believe that any such arms or munitions of war, or other articles, are being or are intended to be exported, or shipped from, or taken out of the United States, in violation of law, the several collectors, naval officers, surveyors, inspectors of customs, and marshals, and deputy marshals of the United States, and every other person duly authorized for the purpose by the President, may seize and detain any articles or munitions of war about to be exported or shipped from, or taken out of the United States, in violation of law, and the vessels or vehicles containing the same, and retain possession thereof until released or disposed of as hereinafter directed. If upon due inquiry as hereinafter provided, the property seized shall appear to have been about to be so unlawfully exported, shipped from, or taken out of the United States, the same shall be forfeited to the United States.

SEC. 2. It shall be the duty of the person making any seizure under this title to apply, with due diligence, to the judge of the district court of the United States, or to the judge of the United States district court of the Canal Zone, or to the judge of a court of first instance in the Philippine Islands, having jurisdiction over the place within which the seizure is made, for a warrant to justify the further detention of the property so seized, which warrant shall be granted only on oath or affirmation showing that there is known or probable cause to believe that the property seized is being or is intended to be exported or shipped from or taken out of the United States in violation of law; and if the judge refuses to issue the warrant, or application therefor is not made by the person making the seizure within a reasonable time, not exceeding ten days after the seizure, the property shall forthwith be restored to the owner or person from whom seized. If the judge is satisfied that the seizure was justified under the provisions of this title and issues his warrant accordingly, then the property shall be detained by the person seizing it until the President, who is hereby expressly authorized so to do, orders it to be restored to the owner or claimant, or until it is discharged in due course of law on petition of the claimant, or on trial of condemnation proceedings, as hereinafter provided.

SEC. 3. The owner or claimant of any property seized under this title may, at any time before condemnation proceedings have been instituted, as hereinafter provided, file his petition for its restoration in the district court of the United States, or the district court of the Canal Zone, or the court of first instance in the Philippine Islands, having jurisdiction over the place in which the seizure was made, whereupon the court shall advance the cause for hearing and determination with all possible dispatch, and, after causing notice to be given to the United States attorney for the district and to the person making the seizure, shall proceed to hear and decide whether the property seized shall be restored to the petitioner or forfeited to the United States.

SEC. 4. Whenever the person making any seizure under this title applies for and obtains a warrant for the detention of the property, and (a) upon the hearing and determination of the petition of the owner or claimant restoration is denied, or (b) the owner or claimant fails to file a petition for restoration within thirty days after the seizure, the United States attorney for the district wherein it was seized, upon direction of the Attorney General, shall institute libel proceedings in the United States district court or the district court of the Canal Zone or the court of first instance of the Philippine Islands having jurisdiction over the place wherein the seizure was made, against the property for condemnation; and if, after trial and hearing of the issues involved, the property is condemned, it shall be disposed of by sale, and the proceeds thereof, less the legal costs and charges, paid into the Treasury.

SEC. 5. The proceedings in such summary trials upon the petition of the owner or claimant of the property seized, as well as in the libel cases herein provided for, shall conform, as near as may be, to the proceedings in admiralty, except that either party may demand trial by jury of any issue of fact joined in such libel cases, and all such proceedings shall be at the suit of and in the name of the United States: *Provided*, That upon the payment of the costs and legal expenses of both the summary trials and the libel proceedings herein provided for, and the execution and delivery of a good and sufficient bond in an

amount double the value of the property seized, conditioned that it will not be exported or used or employed contrary to the provisions of this title, the court, in its discretion, may direct that it be delivered to the owners thereof or to the claimants thereof.

SEC. 6. Except in those cases in which the exportation of arms and munitions of war or other articles is forbidden by proclamation or otherwise by the President, as provided in section one of this title, nothing herein contained shall be construed to extend to, or interfere with any trade in such commodities, conducted with any foreign port or place wheresoever, or with any other trade which might have been lawfully carried on before the passage of this title, under the law of nations, or under the treaties or conventions entered into by the United States, or under the laws thereof.

SEC. 7. Upon payment of the costs and legal expenses incurred in any such summary trial for possession or libel proceedings, the President is hereby authorized, in his discretion, to order the release and restoration to the owner or claimant, as the case may be, of any property seized or condemned under the provisions of this title.

SEC. 8. The President may employ such part of the land or naval forces of the United States as he may deem necessary to carry out the purposes of this title.

TITLE VII.

CERTAIN EXPORTS IN TIME OF WAR UNLAWFUL.

SECTION 1. Whenever during the present war the President shall find that the public safety shall so require, and shall make proclamation thereof, it shall be unlawful to export from or ship from or take out of the United States to any country named in such proclamation any article or articles mentioned in such proclamation, except at such time or times, and under such regulations and orders, and subject to such limitations and exceptions as the President shall prescribe, until otherwise ordered by the President or by Congress: *Provided, however*, That no preference shall be given to the ports of one State over those of another.

SEC. 2. Any person who shall export, ship, or take out, or deliver or attempt to deliver for export, shipment, or taking out, any article in violation of this title, or of any regulation or order made hereunder, shall be fined not more than \$10,000, or, if a natural person, imprisoned for not more than two years, or both; and any article so delivered or exported, shipped, or taken out, or so attempted to be delivered or exported, shipped, or taken out, shall be seized and forfeited to the United States; and any officer, director, or agent of a corporation who participates in any such violation shall be liable to like fine or imprisonment, or both.

SEC. 3. Whenever there is reasonable cause to believe that any vessel, domestic or foreign, is about to carry out of the United States any article or articles in violation of the provisions of this title, the collector of customs for the district in which such vessel is located is hereby authorized and empowered, subject to review by the Secretary of Commerce, to refuse clearance to any such vessel, domestic or foreign, for which clearance is required by law, and by formal notice served upon the owners, master, or person or persons in command or charge of any domestic vessel for which clearance is not required by law, to forbid the departure of such vessel from the port, and it shall thereupon be unlawful for such vessel to depart. Whoever, in violation of any of the provisions of this section shall take, or attempt to take, or authorize the taking of any such vessel, out of port or from the jurisdiction of the United States, shall be fined not more than \$10,000 or imprisoned not more than two years, or both; and, in addition, such vessel, her tackle, apparel, furniture, equipment, and her forbidden cargo shall be forfeited to the United States.

TITLE VIII.

DISTURBANCE OF FOREIGN RELATIONS.

SECTION 1. Whoever, in relation to any dispute or controversy between a foreign government and the United States, shall willfully and knowingly make any untrue statement, either orally or in writing, under oath before any person authorized and empowered to administer oaths, which the affiant has knowledge or reason to believe will, or may be used to influence the measures or conduct

of any foreign government, or of any officer or agent of any foreign government, to the injury of the United States, or with a view or intent to influence any measure of or action by the Government of the United States, or any branch thereof, to the injury of the United States, shall be fined not more than \$5,000 or imprisoned not more than five years, or both.

SEC. 2. Whoever within the jurisdiction of the United States shall falsely assume or pretend to be a diplomatic or consular, or other official of a foreign government duly accredited as such to the Government of the United States with intent to defraud such foreign government or any person, and shall take upon himself to act as such, or in such pretended character shall demand or obtain, or attempt to obtain from any person or from said foreign government, or from any officer thereof, any money, paper, document, or other thing of value, shall be fined not more than \$5,000, or imprisoned not more than five years, or both.

SEC. 3. Whoever, other than a diplomatic or consular officer or attaché, shall act in the United States as an agent of a foreign government without prior notification to the Secretary of State shall be fined not more than \$5,000, or imprisoned not more than five years, or both.

SEC. 4. The words "foreign government," as used in this Act and in sections one hundred and fifty-six, one hundred and fifty-seven, one hundred and sixty-one, one hundred and seventy, one hundred and seventy-one, one hundred and seventy-two, one hundred and seventy-three, and two hundred and twenty of the Act of March fourth, nineteen hundred and nine, entitled "An Act to codify, revise, and amend the penal laws of the United States," shall be deemed to include any Government, faction, or body of insurgents within a country with which the United States is at peace, which Government, faction, or body of insurgents may or may not have been recognized by the United States as a Government.

SEC. 5. If two or more persons within the jurisdiction of the United States conspire to injure or destroy specific property situated within a foreign country and belonging to a foreign Government or to any political subdivision thereof with which the United States is at peace, or any railroad, canal, bridge, or other public utility so situated, and if one or more of such persons commits an act within the jurisdiction of the United States to effect the object of the conspiracy, each of the parties to the conspiracy shall be fined not more than \$5,000, or imprisoned not more than three years, or both. Any indictment or information under this section shall describe the specific property which it was the object of the conspiracy to injure or destroy.

TITLE IX.

PASSPORTS.

SECTION 1. Before a passport is issued to any person by or under authority of the United States such person shall subscribe to and submit a written application duly verified by his oath before a person authorized and empowered to administer oaths, which said application shall contain a true recital of each and every matter of fact which may be required by law or by any rules authorized by law to be stated as a prerequisite to the issuance of any such passport. Clerks of United States courts, agents of the Department of State, or other Federal officials authorized, or who may be authorized, to take passport applications and administer oaths thereon, shall collect, for all services in connection therewith, a fee of \$1, and no more, in lieu of all fees prescribed by any statute of the United States, whether the application is executed singly, in duplicate, or in triplicate.

SEC. 2. Whoever shall willfully and knowingly make any false statement in an application for passport with intent to induce or secure the issuance of a passport under the authority of the United States, either for his own use or the use of another, contrary to the laws regulating the issuance of passports or the rules prescribed pursuant to such laws, or whoever shall willfully and knowingly use or attempt to use, or furnish to another for use, any passport the issue of which was secured in any way by reason of any false statement, shall be fined not more than \$2,000 or imprisoned not more than five years or both.

SEC. 3. Whoever shall willfully and knowingly use, or attempt to use, any passport issued or designed for the use of another than himself, or whoever shall willfully and knowingly use or attempt to use any passport in violation of the conditions or restrictions therein contained, or of the rules prescribed pursuant to the laws regulating the issuance of passports, which said rules

shall be printed on the passport; or whoever shall willfully and knowingly furnish, dispose of, or deliver a passport to any person, for use by another than the person for whose use it was originally issued and designed, shall be fined not more than \$2,000 or imprisoned not more than five years, or both.

SEC. 4. Whoever shall falsely make, forge, counterfeit, mutilate, or alter, or cause or procure to be falsely made, forged, counterfeited, mutilated, or altered any passport or instrument purporting to be a passport, with intent to use the same, or with intent that the same may be used by another; or whoever shall willfully or knowingly use, or attempt to use, or furnish to another for use any such false, forged, counterfeited, mutilated, or altered passport or instrument purporting to be a passport, or any passport validly issued which has become void by the occurrence of any condition therein prescribed invalidating the same, shall be fined not more than \$2,000 or imprisoned not more than five years, or both.

TITLE X.

COUNTERFEITING GOVERNMENT SEAL.

SECTION 1. Whoever shall fraudulently or wrongfully affix or impress the seal of any executive department, or of any bureau, commission, or office of the United States, to or upon any certificate, instrument, commission, document, or paper of any description; or whoever, with knowledge of its fraudulent character, shall with wrongful or fraudulent intent use, buy, procure, sell, or transfer to another any such certificate, instrument, commission, document, or paper, to which or upon which said seal has been so fraudulently affixed or impressed, shall be fined not more than \$5,000 or imprisoned not more than five years, or both.

SEC. 2. Whoever shall falsely make, forge, counterfeit, mutilate, or alter, or cause or procure to be made, forged, counterfeited, mutilated, or altered, or shall willingly assist in falsely making, forging, counterfeiting, mutilating, or altering, the seal of any executive department, or any bureau, commission, or office of the United States, or whoever shall knowingly use, affix, or impress any such fraudulently made, forged, counterfeited, mutilated, or altered seal to or upon any certificate, instrument, commission, document, or paper, of any description, or whoever with wrongful or fraudulent intent shall have possession of any such falsely made, forged, counterfeited, mutilated, or altered seal, knowing the same to have been so falsely made, forged, counterfeited, mutilated, or altered, shall be fined not more than \$5,000 or imprisoned not more than ten years, or both.

SEC. 3. Whoever shall falsely make, forge, counterfeit, alter, or tamper with any naval, military, or official pass or permit, issued by or under the authority of the United States, or with wrongful or fraudulent intent shall use or have in his possession any such pass or permit, or shall personate or falsely represent himself to be or not to be a person to whom such pass or permit has been duly issued, or shall willfully allow any other person to have or use any such pass or permit, issued for his use alone, shall be fined not more than \$2,000 or imprisoned not more than five years, or both.

TITLE XI.

SEARCH WARRANTS.

SECTION 1. A search warrant authorized by this title may be issued by a judge of a United States district court, or by a judge of a State or Territorial court of record, or by a United States commissioner for the district wherein the property sought is located.

SEC. 2. A search warrant may be issued under this title upon either of the following grounds:

1. When the property was stolen or embezzled in violation of a law of the United States; in which case it may be taken on the warrant from any house or other place in which it is concealed, or from the possession of the person by whom it was stolen or embezzled, or from any person in whose possession it may be.

2. When the property was used as the means of committing a felony; in which case it may be taken on the warrant from any house or other place in which it is concealed, or from the possession of the person by whom it was used in the commission of the offense, or from any person in whose possession it may be.

3. When the property, or any paper, is possessed, controlled, or used in violation of section twenty-two of this title; in which case it may be taken on the warrant from the person violating said section, or from any person in whose possession it may be, or from any house or other place in which it is concealed.

SEC. 3. A search warrant can not be issued but upon probable cause, supported by affidavit, naming or describing the person and particularly describing the property and the place to be searched.

SEC. 4. The judge or commissioner must, before issuing the warrant, examine on oath the complainant and any witness he may produce, and require their affidavits or take their depositions in writing and cause them to be subscribed by the parties making them.

SEC. 5. The affidavits or depositions must set forth the facts tending to establish the grounds of the application or probable cause for believing that they exist.

SEC. 6. If the judge or commissioner is thereupon satisfied of the existence of the grounds of the application or that there is probable cause to believe their existence, he must issue a search warrant, signed by him with his name of office, to a civil officer of the United States duly authorized to enforce or assist in enforcing any law thereof, or to a person so duly authorized by the President of the United States, stating the particular grounds or probable cause for its issue and the names of the persons whose affidavits have been taken in support thereof, and commanding him forthwith to search the person or place named, for the property specified, and to bring it before the judge or commissioner.

SEC. 7. A search warrant may in all cases be served by any of the officers mentioned in its direction, but by no other person, except in aid of the officer on his requiring it, he being present and acting in its execution.

SEC. 8. The officer may break open any outer or inner door or window of a house, or any part of a house, or anything therein, to execute the warrant, if, after notice of his authority and purpose, he is refused admittance.

SEC. 9. He may break open any outer or inner door or window of a house for the purpose of liberating a person who, having entered to aid him in the execution of the warrant, is detained therein, or when necessary for his own liberation.

SEC. 10. The judge or commissioner must insert a direction in the warrant that it be served in the daytime, unless the affidavits are positive that the property is on the person or in the place to be searched, in which case he may insert a direction that it be served at any time of the day or night.

SEC. 11. A search warrant must be executed and returned to the judge or commissioner who issued it within ten days after its date; after the expiration of this time the warrant, unless executed, is void.

SEC. 12. When the officer takes property under the warrant, he must give a copy of the warrant together with a receipt for the property taken (specifying it in detail) to the person from whom it was taken by him, or in whose possession it was found; or, in the absence of any person, he must leave it in the place where he found the property.

SEC. 13. The officer must forthwith return the warrant to the judge or commissioner and deliver to him a written inventory of the property taken, made publicly or in the presence of the person from whose possession it was taken, and of the applicant for the warrant, if they are present, verified by the affidavit of the officer at the foot of the inventory and taken before the judge or commissioner at the time, to the following effect: "I, R. S., the officer by whom this warrant was executed, do swear that the above inventory contains a true and detailed account of all the property taken by me on the warrant."

SEC. 14. The judge or commissioner must thereupon, if required, deliver a copy of the inventory to the person from whose possession the property was taken and to the applicant for the warrant.

SEC. 15. If the grounds on which the warrant was issued be controverted, the judge or commissioner must proceed to take testimony in relation thereto, and the testimony of each witness must be reduced to writing and subscribed by each witness.

SEC. 16. If it appears that the property or paper taken is not the same as that described in the warrant or that there is no probable cause for believing the existence of the grounds on which the warrant was issued, the judge or commissioner must cause it to be restored to the person from whom it was taken; but if it appears that the property or paper taken is the same as that described in the warrant and that there is probable cause for believing the existence of

the grounds on which the warrant was issued, then the judge or commissioner shall order the same retained in the custody of the person seizing it or to be otherwise disposed of according to law.

SEC. 17. The judge or commissioner must annex the affidavits, search warrants, return, inventory, and evidence, and if he has not power to inquire into the offense in respect to which the warrant was issued he must at once file the same, together with a copy of the record of his proceedings, with the clerk of the court having power to so inquire.

SEC. 18. Whoever shall knowingly and willfully obstruct, resist, or oppose any such officer or person in serving or attempting to serve or execute any such search warrant, or shall assault, beat, or wound any such officer or person, knowing him to be an officer or person so authorized, shall be fined not more than \$1,000 or imprisoned not more than two years.

SEC. 19. Sections one hundred and twenty-five and one hundred and twenty-six of the Criminal Code of the United States shall apply to and embrace all persons making oath or affirmation or procuring the same under the provisions of this title, and such persons shall be subject to all the pains and penalties of said sections.

SEC. 20. A person who maliciously and without probable cause procures a search warrant to be issued and executed shall be fined not more than \$1,000 or imprisoned not more than one year.

SEC. 21. An officer who in executing a search warrant willfully exceeds his authority, or exercises it with unnecessary severity, shall be fined not more than \$1,000 or imprisoned not more than one year.

SEC. 22. Whoever, in aid of any foreign Government, shall knowingly and willfully have possession of or control over any property or papers designed or intended for use or which is used as the means of violating any penal statute, or any of the rights or obligations of the United States under any treaty or the law of nations, shall be fined not more than \$1,000 or imprisoned not more than two years, or both.

SEC. 23. Nothing contained in this title shall be held to repeal or impair any existing provisions of law regulating search and the issue of search warrants.

TITLE XII.

USE OF MAILS.

SECTION 1. Every letter, writing, circular, postal card, picture, print, engraving, photograph, newspaper, pamphlet, book, or other publication, matter or thing, of any kind, in violation of any of the provisions of this Act is hereby declared to be nonmailable matter and shall not be conveyed in the mails or delivered from any post office or by any letter carrier: *Provided*, That nothing in this Act shall be so construed as to authorize any person other than an employee of the Dead Letter Office, duly authorized thereto, or other person upon a search warrant authorized by law, to open any letter not addressed to himself.

SEC. 2. Every letter, writing, circular, postal card, picture, print, engraving, photograph, newspaper, pamphlet, book, or other publication, matter or thing, of any kind, containing any matter advocating or urging treason, insurrection, or forcible resistance to any law of the United States, is hereby declared to be nonmailable.

SEC. 3. Whoever shall use or attempt to use the mails or Postal Service of the United States for the transmission of any matter declared by this title to be nonmailable, shall be fined not more than \$5,000 or imprisoned not more than five years, or both. Any person violating any provision of this title may be tried and punished either in the district in which the unlawful matter or publication was mailed, or to which it was carried by mail for delivery according to the direction thereon, or in which it was caused to be delivered by mail to the person to whom it was addressed.

TITLE XIII.

GENERAL PROVISIONS.

SECTION 1. The term "United States" as used in this Act includes the Canal Zone and all territory and waters, continental or insular, subject to the jurisdiction of the United States.

SEC. 2. The several courts of first instance in the Philippine Islands and the district court of the Canal Zone shall have jurisdiction of offenses under

this Act committed within their respective districts, and concurrent jurisdiction with the district courts of the United States of offenses under this Act committed upon the high seas, and of conspiracies to commit such offenses, as defined by section thirty-seven of the Act entitled "An Act to codify, revise, and amend the penal laws of the United States," approved March fourth, nineteen hundred and nine, and the provisions of said section, for the purpose of this Act, are hereby extended to the Philippine Islands, and to the Canal Zone. In such cases the district attorneys of the Philippine Islands and of the Canal Zone shall have the powers and perform the duties provided in this Act for United States attorneys.

SEC. 3. Offenses committed and penalties, forfeitures, or liabilities incurred prior to the taking effect hereof under any law embraced in or changed, modified, or repealed by any chapter of this Act may be prosecuted and punished, and suits and proceedings for causes arising or acts done or committed prior to the taking effect hereof may be commenced and prosecuted, in the same manner and with the same effect as if this Act had not been passed.

SEC. 4. If any clause, sentence, paragraph, or part of this Act shall for any reason be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair, or invalidate the remainder thereof but shall be confined in its operation to the clause, sentence, paragraph, or part thereof directly involved in the controversy in which such judgment shall have been rendered.

Approved, June 15, 1917.

JOINT RESOLUTION To correct an error in the sundry civil appropriation act for the fiscal year nineteen hundred and eighteen.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That that portion of the act entitled "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for other purposes," which reads: "For maintenance and operation of the Panama Canal, salary of the governor, \$100,000;" is amended to read as follows: "For maintenance and operation of the Panama Canal, salary of the governor, \$10,000;".

Approved, June 21, 1917.

AN ACT Making appropriations to supply urgent deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and prior fiscal years, on account of war expenses, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply urgent deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and prior fiscal years, on account of war expenses, and for other purposes, namely:

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DEPARTMENT OF STATE.

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FOREIGN INTERCOURSE.

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For relief and protection of American seamen in foreign countries, and in the Panama Canal Zone, and shipwrecked American seamen in the Territory of Alaska, in the Hawaiian Islands, Porto Rico, and the Philippine Islands, fiscal year nineteen hundred and seventeen, \$40,000.

* * * * *

PANAMA CANAL.

FORTIFICATIONS.

For extraordinary expenses heretofore and hereafter incurred by the governor of the Panama Canal in protecting the canal and canal structures, \$300,000.

For extraordinary expenses for military purposes heretofore and hereafter incurred in protecting the Panama Canal and canal structures, \$150,000.

Ordnance Depot: For additional amount for a building for storing artillery vehicles, \$5,500;

For a set of quarters, single family cottage for armament machinist at Fort Grant, \$2,700.

Submarine base (Coco Solo Point): For dredging inner basin and channel to same, concrete dock, containing walls, finger docks, tracks, dry fill, municipal works, electrical work, officers' quarters, barracks, shops, storehouses, stationary crane, magazines and torpedo storage, shop and power tools, furniture, and plant equipment, \$902,625: *Provided*, That the construction work hereunder shall be performed under the direction of the governor of the Panama Canal.

* * * * *

MEDICAL DEPARTMENT.

MEDICAL AND HOSPITAL DEPARTMENT: For the purchase of medical and hospital supplies; gas masks; motor ambulances, and motorcycles for medical service, their maintenance, repair, and operation: *Provided*, That the Secretary of War may in his discretion select types and makes of motor ambulances for the Army and authorize their purchase without regard to the laws prescribing advertisement for proposals for supplies and material for the Army; disinfectants; typewriting machines for military posts, camps, hospitals, hospital ships, and transports; supplies required for mosquito destruction in and about the military posts in the Canal Zone; * * * \$100,000,000.

* * * * *

SEC. 6. That section five of the Act of June twenty-second, nineteen hundred and six, prohibiting the transfer of employees from one executive department to another, shall apply with equal force and effect to the transfer of employees from executive departments to independent establishments and vice versa and to the transfer of employees from one independent establishment to another: *Provided*, That the United States Shipping Board Emergency Fleet Corporation shall be considered a Government establishment for the purposes of this section.

SEC. 7. That no civil employee in any of the executive departments or other Government establishments, or who has been employed therein within the period of one year next preceding his proposed employment in any other executive department or other Government establishment, shall be employed hereafter and paid from a lump-sum appropriation in any other executive department or other Government establishment at an increased rate of compensation. And no civil employee in any of the executive departments or other Government establishments or who has been employed therein within the period of one year next preceding his proposed employment in any other executive department or other Government establishment and who may be employed in another executive department or other Government establishment shall be granted an increase in compensation within the period of one year following such reemployment: *Provided*, That the United States Shipping Board Emergency Fleet Corporation shall be considered a Government establishment for the purposes of this section: *Provided further*, That this section shall not be construed to repeal section five of the Act of June twenty-second, nineteen hundred and six, which prohibits the transfer of employees from one department to another.

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Approved, October 6, 1917.

AN ACT To define, regulate, and punish trading with the enemy, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act shall be known as the "Trading with the enemy Act."

SEC. 2. That the word "enemy," as used herein, shall be deemed to mean, for the purposes of such trading and of this Act—

(a) Any individual, partnership, or other body of individuals, of any nationality, resident within the territory (including that occupied by the military and naval forces) of any nation with which the United States is at war, or resident outside the United States and doing business within such territory, and any corporation incorporated within such territory of any nation with

which the United States is at war or incorporated within any country other than the United States and doing business within such territory.

(b) The government of any nation with which the United States is at war, or any political or municipal subdivision thereof, or any officer, official, agent, or agency thereof.

(c) Such other individuals, or body or class of individuals, as may be natives, citizens, or subjects of any nation with which the United States is at war, other than citizens of the United States, wherever resident or wherever doing business, as the President, if he shall find the safety of the United States or the successful prosecution of the war shall so require, may, by proclamation, include within the term "enemy."

The words "ally of enemy," as used herein, shall be deemed to mean—

(a) Any individual, partnership, or other body of individuals, of any nationality, resident within the territory (including that occupied by the military and naval forces) of any nation which is an ally of a nation with which the United States is at war, or resident outside the United States and doing business within such territory, and any corporation incorporated within such territory of such ally nation, or incorporated within any country other than the United States and doing business within such territory.

(b) The government of any nation which is an ally of a nation with which the United States is at war, or any political or municipal subdivision of such ally nation, or any officer, official, agent, or agency thereof.

(c) Such other individuals, or body or class of individuals, as may be natives, citizens, or subjects of any nation which is an ally of a nation with which the United States is at war, other than citizens of the United States, wherever resident or wherever doing business, as the President, if he shall find the safety of the United States or the successful prosecution of the war shall so require, may, by proclamation, include within the term "ally of enemy."

The word "person," as used herein, shall be deemed to mean an individual, partnership, association, company, or other unincorporated body of individuals, or corporation or body politic.

The words "United States," as used herein, shall be deemed to mean all land and water, continental or insular, in any way within the jurisdiction of the United States or occupied by the military or naval forces thereof.

The words "the beginning of the war," as used herein, shall be deemed to mean midnight ending the day on which Congress has declared or shall declare war or the existence of a state of war.

The words "end of the war," as used herein, shall be deemed to mean the date of proclamation of exchange of ratifications of the treaty of peace, unless the President shall, by proclamation, declare a prior date, in which case the date so proclaimed shall be deemed to be the "end of the war" within the meaning of this Act.

The words "bank or banks," as used herein, shall be deemed to mean and include national banks, State banks, trust companies, or other banks or banking associations doing business under the laws of the United States, or of any State of the United States.

The words "to trade," as used herein, shall be deemed to mean—

(a) Pay, satisfy, compromise, or give security for the payment or satisfaction of any debt or obligation.

(b) Draw, accept, pay, present for acceptance or payment, or indorse any negotiable instrument or chose in action.

(c) Enter into, carry on, complete, or perform any contract, agreement, or obligation.

(d) Buy or sell, loan or extend credit, trade in, deal with, exchange, transmit, transfer, assign, or otherwise dispose of, or receive any form of property.

(e) To have any form of business or commercial communication or intercourse with.

SEC. 3. That it shall be unlawful—

(a) For any person in the United States, except with the license of the President, granted to such person, or to the enemy, or ally of enemy, as provided in this Act, to trade, or attempt to trade, either directly or indirectly, with, to, or from, or for, or on account of, or on behalf of, or for the benefit of, any other person, with knowledge or reasonable cause to believe that such other person is an enemy or ally of enemy, or is conducting or taking part in such trade, directly or indirectly, for, or on account of, or on behalf of, or for the benefit of, an enemy or ally of enemy.

(b) For any person, except with the license of the President, to transport or attempt to transport into or from the United States, or for any owner, master, or other person in charge of a vessel of American registry to transport or attempt to transport from any place to any other place, any subject or citizen of an enemy or ally of enemy nation, with knowledge or reasonable cause to believe that the person transported or attempted to be transported is such subject or citizen.

(c) For any person (other than a person in the service of the United States Government or of the Government of any nation, except that of an enemy or ally of enemy nation, and other than such persons or classes of persons as may be exempted hereunder by the President or by such person as he may direct), to send, or take out of, or bring into, or attempt to send, or take out of, or bring into the United States, any letter or other writing or tangible form of communication, except in the regular course of the mail; and it shall be unlawful for any person to send, take, or transmit, or attempt to send, take, or transmit out of the United States, any letter or other writing, book, map, plan, or other paper, picture, or any telegram, cablegram, or wireless message, or other form of communication intended for or to be delivered, directly or indirectly, to an enemy or ally of enemy: *Provided, however*, That any person may send, take, or transmit out of the United States anything herein forbidden if he shall first submit the same to the President, or to such officer as the President may direct, and shall obtain the license or consent of the President, under such rules and regulations, and with such exemptions, as shall be prescribed by the President.

(d) Whenever, during the present war, the President shall deem that the public safety demands it, he may cause to be censored under such rules and regulations as he may from time to time establish, communications by mail, cable, radio, or other means of transmission passing between the United States and any foreign country he may from time to time specify, or which may be carried by any vessel or other means of transportation touching at any port, place, or territory of the United States and bound to or from any foreign country. Any person who willfully evades or attempts to evade the submission of any such communication to such censorship or willfully uses or attempts to use any code or other device for the purpose of concealing from such censorship the intended meaning of such communication shall be punished as provided in section sixteen of this Act.

SEC. 4. (a) Every enemy or ally of enemy insurance or reinsurance company, and every enemy or ally of enemy, doing business within the United States through an agency or branch office, or otherwise, may, within thirty days after the passage of this Act, apply to the President for a license to continue to do business; and, within thirty days after such application, the President may enter an order either granting or refusing to grant such license. The license, if granted, may be temporary or otherwise, and for such period of time, and may contain such provisions and conditions regulating the business, agencies, managers and trustees and the control and disposition of the funds of the company, or of such enemy or ally of enemy, as the President shall deem necessary for the safety of the United States; and any license granted hereunder may be revoked or regranted or renewed in such manner and at such times as the President shall determine: *Provided, however*, That reasonable notice of his intent to refuse to grant a license or to revoke a license granted to any reinsurance company shall be given by him to all insurance companies incorporated within the United States and known to the President to be doing business with such reinsurance company: *Provided further*, That no insurance company, organized within the United States, shall be obligated to continue any existing contract, entered into prior to the beginning of the war, with any enemy or ally of enemy insurance or reinsurance company, but any such company may abrogate and cancel any such contract by serving thirty days' notice in writing upon the President of its election to abrogate such contract.

For a period of thirty days after the passage of this Act, and further pending the entry of such order by the President, after application made by any enemy or ally of enemy insurance or reinsurance company, within such thirty days as above provided, the provisions of the President's proclamation of April sixth, nineteen hundred and seventeen, relative to agencies in the United States of certain insurance companies, as modified by the provisions of the President's proclamation of July thirteenth, nineteen hundred and seventeen, relative to marine and war-risk insurance, shall remain in full force and effect so far as it

applies to such German insurance companies, and the conditions of said proclamation of April sixth, nineteen hundred and seventeen, as modified by said proclamation of July thirteenth, nineteen hundred and seventeen, shall also during said period of thirty days after the passage of this Act, and pending the order of the President as herein provided, apply to any enemy or ally of enemy insurance or reinsurance company, anything in this Act to the contrary notwithstanding. It shall be unlawful for any enemy or ally of enemy insurance or reinsurance company, to whom license is granted, to transmit out of the United States any funds belonging to or held for the benefit of such company or to use any such funds as the basis for the establishment directly or indirectly of any credit within or outside of the United States to, or for the benefit of, or on behalf of, or on account of, an enemy or ally of enemy.

For a period of thirty days after the passage of this Act, and further pending the entry of such order by the President, after application made within such thirty days by any enemy or ally of enemy, other than an insurance or reinsurance company as above provided, it shall be lawful for such enemy or ally of enemy to continue to do business in this country and for any person to trade with, to, from, for, on account of, on behalf of or for the benefit of such enemy or ally of enemy, anything in this Act to the contrary notwithstanding: *Provided, however,* That the provisions of sections three and sixteen hereof shall apply to any act or attempted act of transmission or transfer of money or other property out of the United States and to the use or attempted use of such money or property as the basis for the establishment of any credit within or outside of the United States to, or for the benefit of, or on behalf of, or on account of, an enemy or ally of enemy.

If no license is applied for within thirty days after the passage of this Act, or if a license shall be refused to any enemy or ally of enemy, whether insurance or reinsurance company or other person, making application, or if any license granted shall be revoked by the President, the provisions of sections three and sixteen hereof shall forthwith apply to all trade or to any attempt to trade with, to, from, for, by, on account of, or on behalf of, or for the benefit of such company or other person: *Provided, however,* That after such refusal or revocation, anything in this Act to the contrary notwithstanding, it shall be lawful for a policyholder or for an insurance company, not an enemy or ally of enemy, holding insurance or having effected reinsurance in or with such enemy or ally of enemy insurance or reinsurance company, to receive payment of, and for such enemy or ally of enemy insurance or reinsurance company to pay any premium, return premium, claim, money, security, or other property due or which may become due on or in respect to such insurance or reinsurance in force at the date of such refusal or revocation of license; and nothing in this Act shall vitiate or nullify then existing policies or contracts of insurance or reinsurance, or the conditions thereof; and any such policyholder or insurance company, not an enemy or ally of enemy, having any claim to or upon money or other property of the enemy or ally of enemy insurance or reinsurance company in the custody or control of the alien property custodian, hereinafter provided for, or of the Treasurer of the United States, may make application for the payment thereof and may institute suit as provided in section nine hereof.

(b) That, during the present war, no enemy, or ally of enemy, and no partnership of which he is a member or was a member at the beginning of the war, shall for any purpose assume or use any name other than that by which such enemy or partnership was ordinarily known at the beginning of the war, except under license from the President.

Whenever, during the present war, in the opinion of the President the public safety or public interest requires, the President may prohibit any or all foreign insurance companies from doing business in the United States, or the President may license such company or companies to do business upon such terms as he may deem proper.

SEC. 5. (a) That the President, if he shall find it compatible with the safety of the United States and with the successful prosecution of the war, may, by proclamation, suspend the provisions of this Act so far as they apply to an ally of enemy, and he may revoke or renew such suspension from time to time; and the President may grant licenses, special or general, temporary or otherwise, and for such period of time and containing such provisions and conditions as he shall prescribe, to any person or class of persons to do business as provided in subsection (a) of section four hereof, and to perform any act made unlawful without such license in section three hereof, and to file and prosecute applications under subsection (b) of section ten hereof; and he may revoke or renew

such licenses from time to time, if he shall be of opinion that such grant or revocation or renewal shall be compatible with the safety of the United States and with the successful prosecution of the war; and he may make such rules and regulations, not inconsistent with law, as may be necessary and proper to carry out the provisions of this Act; and the President may exercise any power or authority conferred by this Act through such officer or officers as he shall direct.

If the President shall have reasonable cause to believe that any act is about to be performed in violation of section three hereof he shall have authority to order the postponement of the performance of such act for a period not exceeding ninety days, pending investigation of the facts by him.

(b) That the President may investigate, regulate, or prohibit, under such rules and regulations as he may prescribe, by means of licenses or otherwise, any transactions in foreign exchange, export or ear-markings of gold or silver coin or bullion or currency, transfers of credit in any form (other than credits relating solely to transactions to be executed wholly within the United States), and transfers of evidences of indebtedness or of the ownership of property between the United States and any foreign country, whether enemy, ally of enemy or otherwise, or between residents of one or more foreign countries, by any person within the United States; and he may require any such person engaged in any such transaction to furnish, under oath, complete information relative thereto, including the production of any books of account, contracts, letters or other papers, in connection therewith in the custody or control of such person, either before or after such transaction is completed.

Sec. 6. That the President is authorized to appoint, prescribe the duties of, and fix the salary (not to exceed \$5,000 per annum) of an official to be known as the alien property custodian, who shall be empowered to receive all money and property in the United States due or belonging to an enemy, or ally of enemy, which may be paid, conveyed, transferred, assigned, or delivered to said custodian under the provisions of this Act; and to hold, administer, and account for the same under the general direction of the President and as provided in this Act. The alien property custodian shall give such bond or bonds, and in such form and amount, and with such security as the President shall prescribe. The President may further employ in the District of Columbia and elsewhere and fix the compensation of such clerks, attorneys, investigators, accountants, and other employees as he may find necessary for the due administration of the provisions of this Act: *Provided*, That such clerks, investigators, accountants, and other employees shall be appointed from lists of eligibles to be supplied by the Civil Service Commission and in accordance with the civil-service law: *Provided further*, That the President shall cause a detailed report to be made to Congress on the first day of January of each year of all proceedings had under this Act during the year preceding. Such report shall contain a list of all persons appointed or employed, with the salary or compensation paid to each, and a statement of the different kinds of property taken into custody and the disposition made thereof.

Sec. 7. (a) That every corporation incorporated within the United States, and every unincorporated association, or company, or trustee, or trustees within the United States, issuing shares or certificates representing beneficial interests, shall, under such rules and regulations as the President may prescribe and, within sixty days after the passage of this Act, and at such other times thereafter as the President may require, transmit to the alien property custodian a full list, duly sworn to, of every officer, director, or stockholder known to be, or whom the representative of such corporation, association, company, or trustee has reasonable cause to believe to be an enemy or ally of enemy resident within the territory, or a subject or citizen residing outside of the United States, of any nation with which the United States is at war, or resident within the territory, or a subject or citizen residing outside of the United States, of any ally of any nation with which the United States is at war, together with the amount of stock or shares owned by each such officer, director, or stockholder, or in which he has any interest.

The President may also require a similar list to be transmitted of all stock or shares owned on February third, nineteen hundred and seventeen, by any person now defined as an enemy or ally of enemy, or in which any such person had any interest; and he may also require a list to be transmitted of all cases in which said corporation, association, company, or trustee has reasonable cause to believe that the stock or shares on February third, nineteen hundred and seventeen, were owned or are owned by such enemy or ally of enemy,

though standing on the books in the name of another: *Provided, however,* That the name of any such officer, director, or stockholder shall be stricken permanently or temporarily from such list by the alien property custodian when he shall be satisfied that he is not such enemy or ally of enemy.

Any person in the United States who holds or has or shall hold or have custody or control of any property beneficial or otherwise, alone or jointly with others, of, for, or on behalf of an enemy or ally of enemy, or of any person whom he may have reasonable cause to believe to be an enemy or ally of enemy and any person in the United States who is or shall be indebted in any way to an enemy or ally of enemy, or to any person whom he may have reasonable cause to believe to be an enemy or ally of enemy, shall, with such exceptions and under such rules and regulations as the President shall prescribe, and within thirty days after the passage of this Act, or within thirty days after such property shall come within his custody or control, or after such debt shall become due, report the fact to the alien-property custodian by written statement under oath containing such particulars as said custodian shall require. The President may also require a similar report of all property so held, of, for, or on behalf of, and of all debts so owed to, any person now defined as an enemy or ally of enemy, on February third, nineteen hundred and seventeen: *Provided,* That the name of any person shall be stricken from the said report by the alien-property custodian, either temporarily or permanently, when he shall be satisfied that such person is not an enemy or ally of enemy. The President may extend the time for filing the lists or reports required by this section for an additional period not exceeding ninety days.

(b) Nothing in this Act contained shall render valid or legal, or be construed to recognize as valid or legal, any act or transaction constituting trade with, to, from, for or on account of, or on behalf or for the benefit of an enemy performed or engaged in since the beginning of the war and prior to the passage of this Act, or any such act or transaction hereafter performed or engaged in except as authorized hereunder, which would otherwise have been or be void, illegal, or invalid at law. No conveyance, transfer, delivery, payment, or loan of money or other property, in violation of section three hereof, made after the passage of this Act, and not under license as herein provided shall confer or create any right or remedy in respect thereof; and no person shall by virtue of any assignment, indorsement, or delivery to him of any debt, bill, note, or other obligation or chose in action by, from, or on behalf of, or on account of, or for the benefit of an enemy or ally of enemy have any right or remedy against the debtor, obligor, or other person liable to pay, fulfill, or perform the same unless said assignment, indorsement, or delivery was made prior to the beginning of the war or shall be made under license as herein provided, or unless, if made after the beginning of the war and prior to the date of passage of this Act, the person to whom the same was made shall prove lack of knowledge and of reasonable cause to believe on his part that the same was made by, from or on behalf of, or an account of, or for the benefit of an enemy or ally of enemy; and any person who knowingly pays, discharges, or satisfies any such debt, note, bill, or other obligation or chose in action shall, on conviction thereof, be deemed to violate section three hereof: *Provided,* That nothing in this Act contained shall prevent the carrying out, completion, or performance of any contract, agreement, or obligation originally made with or entered into by an enemy or ally of enemy where, prior to the beginning of the war and not in contemplation thereof, the interest of such enemy or ally of enemy devolved by assignment or otherwise upon a person not an enemy or ally of enemy, and no enemy or ally of enemy will be benefited by such carrying out, completion, or performance otherwise than by release from obligation thereunder.

Nothing in this Act shall be deemed to prevent payment of money belonging or owing to an enemy or ally of enemy to a person within the United States not an enemy or ally of enemy, for the benefit of such person or of any other person within the United States, not an enemy or ally of enemy, if the funds so paid shall have been received prior to the beginning of the war and such payments arise out of transactions entered into prior to the beginning of the war, and not in contemplation thereof: *Provided,* That such payment shall not be made without the license of the President, general or special, as provided in this Act.

Nothing in this Act shall be deemed to authorize the prosecution of any suit or action at law or in equity in any court within the United States by an enemy or ally of enemy prior to the end of the war, except as provided in section ten hereof: *Provided, however,* That an enemy or ally of enemy licensed to do business under this Act may prosecute and maintain any such suit or

action so far as the same arises solely out of the business transacted within the United States under such license and so long as such license remains in full force and effect: *And provided further*, That an enemy or ally of enemy may defend by counsel any suit in equity or action at law which may be brought against him.

Receipt of notice from the President to the effect that he has reasonable ground to believe that any person is an enemy or ally of enemy shall be prima facie defense to any one receiving the same, in any suit or action at law or in equity brought or maintained, or to any right or set-off or recoupment asserted by, such person and based on failure to complete or perform since the beginning of the war any contract or other obligation. In any prosecution under section sixteen hereof, proof of receipt of notice from the President to the effect that he has reasonable cause to believe that any person is an enemy or ally of enemy shall be prima facie evidence that the person receiving such notice has reasonable cause to believe such other person to be an enemy or ally of enemy within the meaning of section three hereof.

(c) If the President shall so require, any money or other property owing or belonging to or held for, by, on account of, or on behalf of, or for the benefit of an enemy or ally of enemy not holding a license granted by the President hereunder, which the President after investigation shall determine is so owing or so belongs or is so held, shall be conveyed, transferred, assigned, delivered, or paid over to the alien property custodian.

(d) If not required to pay, convey, transfer, assign, or deliver under the provisions of subsection (c) hereof, any person not an enemy or ally of enemy who owes to, or holds for, or on account of, or on behalf of, or for the benefit of an enemy or of an ally of enemy not holding a license granted by the President hereunder, any money or other property, or to whom any obligation or form of liability to such enemy or ally of enemy is presented for payment, may, at his option, with the consent of the President, pay, convey, transfer, assign, or deliver to the alien property custodian said money or other property under such rules and regulations as the President shall prescribe.

(e) No person shall be held liable in any court for or in respect to anything done or omitted in pursuance of any order, rule, or regulation made by the President under the authority of this Act.

Any payment, conveyance, transfer, assignment, or delivery of money or property made to the alien property custodian hereunder shall be a full acquittance and discharge for all purposes of the obligation of the person making the same to the extent of same. The alien property custodian and such other persons as the President may appoint shall have power to execute, acknowledge, and deliver any such instrument or instruments as may be necessary or proper to evidence upon the record or otherwise such acquittance and discharge, and shall, in case of payment to the alien property custodian of any debt or obligation owed to an enemy or ally of enemy, deliver up any notes, bonds, or other evidences of indebtedness or obligation, or any security therefor in which such enemy or ally of enemy had any right or interest that may have come into the possession of the alien property custodian, with like effect as if he or they, respectively, were duly appointed by the enemy or ally of enemy, creditor, or obligee. The President shall issue to every person so appointed a certificate of the appointment and authority of such person, and such certificate shall be received in evidence in all courts within the United States. Whenever any such certificate of authority shall be offered to any registrar, clerk, or other recording officer, Federal or otherwise, within the United States, such officer shall record the same in like manner as a power of attorney, and such record or a duly certified copy thereof shall be received in evidence in all courts of the United States or other courts within the United States.

SEC. 8. (a) That any person not an enemy or ally of enemy holding a lawful mortgage, pledge, or lien, or other right in the nature of security in property on an enemy or ally of enemy which, by law or by the terms of the instrument creating such mortgage, pledge, or lien, or right, may be disposed of on notice or presentation or demand, and any person not an enemy or ally of enemy who is a party to any lawful contract with an enemy or ally of enemy, the terms of which provide for a termination thereof upon notice or for acceleration of maturity on presentation or demand, may continue to hold said property, and, after default, may dispose of the property in accordance with law or may terminate or mature such contract by notice or presentation or demand served or made on the alien property custodian in accordance with the law and the terms of such instrument or contract and under such rules and regulations as

the President shall prescribe; and such notice and such presentation and demand shall have, in all respects, the same force and effect as if duly served or made upon the enemy or ally of enemy personally: *Provided*, That no such rule or regulation shall require that notice or presentation or demand shall be served or made in any case in which, by law or by the terms of said instrument or contract, no notice, presentation, or demand was, prior to the passage of this Act, required; and that in case where, by law or by the terms of such instrument or contract, notice is required, no longer period of notice shall be required: *Provided further*, That if, on any such disposition of property, a surplus shall remain after the satisfaction of the mortgage, pledge, lien, or other right in the nature of security, notice of that fact shall be given to the President pursuant to such rules and regulations as he may prescribe, and such surplus shall be held subject to his further order.

(b) That any contract entered into prior to the beginning of the war between any citizen of the United States or any corporation organized within the United States, and an enemy or ally of an enemy, the terms of which provide for the delivery, during or after any war in which a present enemy or ally of enemy nation has been or is now engaged, of anything produced, mined, or manufactured in the United States, may be abrogated by such citizen or corporation by serving thirty days' notice in writing upon the alien property custodian of his or its election to abrogate such contract.

(c) The running of any statute of limitations shall be suspended with reference to the rights or remedies on any contract or obligation entered into prior to the beginning of the war between parties neither of whom is an enemy or ally of enemy, and containing any promise to pay or liability for payment which is evidenced by drafts or other commercial paper drawn against or secured by funds or other property situated in an enemy or ally of enemy country, and no suit shall be maintained on any such contract or obligation in any court within the United States until after the end of the war, or until the said funds or property shall be released for the payment or satisfaction of such contract or obligation: *Provided, however*, That nothing herein contained shall be construed to prevent the suspension of the running of the statute of limitations in all other cases where such suspension would occur under existing law.

SEC. 9. That any person, not an enemy, or ally of enemy, claiming any interest, right, or title in any money or other property which may have been conveyed, transferred, assigned, delivered, or paid to the alien property custodian hereunder, and held by him or by the Treasurer of the United States, or to whom any debt may be owing from an enemy, or ally of enemy, whose property or any part thereof shall have been conveyed, transferred, assigned, delivered, or paid to the alien property custodian hereunder, and held by him or by the Treasurer of the United States, may file with the said custodian a notice of his claim under oath and in such form and containing such particulars as the said custodian shall require; and the President, if application is made therefor by the claimant, may, with the assent of the owner of said property and of all persons claiming any right, title, or interest therein, order the payment, conveyance, transfer, assignment or delivery to said claimant of the money or other property so held by the alien property custodian or by the Treasurer of the United States or of the interest therein to which the President shall determine said claimant is entitled: *Provided*, That no such order by the President shall bar any person from the prosecution of any suit at law or in equity against the claimant to establish any right, title or interest which he may have in such money or other property. If the President shall not so order within sixty days after the filing of such application, or if the claimant shall have filed the notice as above required and shall have made no application to the President, said claimant may, at any time before the expiration of six months after the end of the war, institute a suit in equity in the district court of the United States for the district in which such claimant resides, or, if a corporation, where it has its principal place of business (to which suit the alien property custodian or the Treasurer of the United States, as the case may be, shall be made a party defendant), to establish the interest, right, title, or debt so claimed, and if suit shall be so instituted then the money or other property of the enemy, or ally of enemy, against whom such interest, right, or title is asserted, or debt claimed, shall be retained in the custody of the alien property custodian, or in the Treasury of the United States, as provided in this Act, and until any final judgment or decree which shall be entered in favor of the claimant shall be fully satisfied by payment or conveyance, transfer, assign-

ment, or delivery by the defendant or by the alien property custodian or Treasurer of the United States on order of the court, or until final judgment or decree shall be entered against the claimant, or suit otherwise terminated.

Except as herein provided, the money or other property conveyed, transferred, assigned, delivered, or paid to the alien property custodian shall not be liable to lien, attachment, garnishment, trustee process, or execution, or subject to any order or decree of any court.

This section shall not apply, however, to money paid to the alien property custodian under section ten hereof.

SEC. 10. That nothing contained in this Act shall be held to make unlawful any of the following Acts:

(a) An enemy, or ally of enemy, may file and prosecute in the United States an application for letters patent, or for registration of trade-mark, print, label, or copyright, and may pay any fees therefor in accordance with and as required by the provisions of existing law and fees for attorneys or agents for filing and prosecuting such applications. Any such enemy, or ally of enemy, who is unable during war, or within six months thereafter, on account of conditions arising out of war, to file any such application, or to pay any official fee, or to take any action required by law within the period prescribed by law, may be granted an extension of nine months beyond the expiration of said period, provided the nation of which the said applicant is a citizen, subject, or corporation shall extend substantially similar privileges to citizens and corporations of the United States.

(b) Any citizen of the United States, or any corporation organized within the United States, may, when duly authorized by the President, pay to an enemy or ally of enemy any tax, annuity, or fee which may be required by the laws of such enemy or ally of enemy nation in relation to patents and trade-marks, prints, labels, and copyrights; and any such citizen or corporation may file and prosecute an application for letters patent or for registration of trade-mark, print, label, or copyright in the country of an enemy, or of an ally of enemy after first submitting such application to the President and receiving license so to file and prosecute, and to pay the fees required by law and customary agents' fees, the maximum amount of which in each case shall be subject to the control of the President.

(c) Any citizen of the United States or any corporation organized within the United States desiring to manufacture, or cause to be manufactured, a machine, manufacture, composition of matter, or design, or to carry on, or to use any trade-mark, print, label or cause to be carried on, a process under any patent or copyrighted matter owned or controlled by an enemy or ally of enemy at any time during the existence of a state of war may apply to the President for a license; and the President is hereby authorized to grant such a license, nonexclusive or exclusive as he shall deem best, provided he shall be of the opinion that such grant is for the public welfare, and that the applicant is able and intends in good faith to manufacture, or cause to be manufactured, the machine, manufacture, composition of matter, or design, or to carry on, or cause to be carried on, the process or to use the trade-mark, print, label or copyrighted matter. The President may prescribe the conditions of this license, including the fixing of prices of articles and products necessary to the health of the military and naval forces of the United States or the successful prosecution of the war, and the rules and regulations under which such license may be granted and the fee which shall be charged therefor, not exceeding \$100, and not exceeding one per centum of the fund deposited as hereinafter provided. Such license shall be a complete defense to any suit at law or in equity instituted by the enemy or ally of enemy owners of the letters patent, trade-mark, print, label or copyright, or otherwise, against the licensee for infringement or for damages, royalty, or other money award on account of anything done by the licensee under such license, except as provided in subsection (f) hereof.

(d) The licensee shall file with the President a full statement of the extent of the use and enjoyment of the license, and of the prices received in such form and at such stated periods (at least annually) as the President may prescribe; and the licensee shall pay at such times as may be required to the alien property custodian not to exceed five per centum of the gross sums received by the licensee from the sale of said inventions or use of the trade-mark, print, label or copyrighted matter or, if the President shall so order, five per centum of the value of the use of such inventions, trade-marks, prints, labels or copyrighted matter to the licensee as established by the President; and sums so paid

shall be deposited by said alien property custodian forthwith in the Treasury of the United States as a trust fund for the said licensee and for the owner of the said patent, trade-mark, print, label or copyright registration as herein-after provided, to be paid from the Treasury upon order of the court, as provided in subdivision (f) of this section, or upon the direction of the alien property custodian.

(e) Unless surrendered or terminated as provided in this Act, any license granted hereunder shall continue during the term fixed in the license or in the absence of any such limitation during the term of the patent, trade-mark, print, label, or copyright registration under which it is granted. Upon violation by the licensee of any of the provisions of this Act, or of the conditions of the license, the President may, after due notice and hearing, cancel any license granted by him.

(f) The owner of any patent, trade-mark, print, label, or copyright under which a license is granted hereunder may, after the end of the war and until the expiration of one year thereafter, file a bill in equity against the licensee in the district court of the United States for the district in which the said licensee resides, or, if a corporation, in which it has its principal place of business (to which suit the Treasurer of the United States shall be made a party), for recovery from the said licensee for all use and enjoyment of the said patented invention, trade-mark, print, label, or copyrighted matter: *Provided, however*, That whenever suit is brought, as above, notice shall be filed with the alien property custodian within thirty days after date of entry of suit: *Provided further*, That the licensee may make any and all defenses which would be available were no license granted. The court on due proceedings had may adjudge and decree to the said owner payment of a reasonable royalty. The amount of said judgment and decree, when final, shall be paid on order of the court to the owner of the patent from the fund deposited by the licensee, so far as such deposit will satisfy said judgment and decree; and the said payment shall be in full or partial satisfaction of said judgment and decree, as the facts may appear; and if, after payment of all such judgments and decrees, there shall remain any balance of said deposit, such balance shall be repaid to the licensee on order of the alien property custodian. If no suit is brought within one year after the end of the war, or no notice is filed as above required, then the licensee shall not be liable to make any further deposits, and all funds deposited by him shall be repaid to him on order of the alien property custodian. Upon entry of suit and notice filed as above required, or upon repayment of funds as above provided, the liability of the licensee to make further reports to the President shall cease.

If suit is brought as above provided, the court may, at any time, terminate the license, and may, in such event, issue an injunction to restrain the licensee from infringement thereafter, or the court, in case the licensee, prior to suit, shall have made investment of capital based on possession of the license, may continue the license for such period and upon such terms and with such royalties as it shall find to be just and reasonable.

(g) Any enemy, or ally of enemy, may institute and prosecute suits in equity against any person other than a licensee under this Act to enjoin infringement of letters patent, trade-mark, print, label, and copyrights in the United States owned or controlled by said enemy or ally of enemy, in the same manner and to the extent that he would be entitled so to do if the United States was not at war: *Provided*, That no final judgment or decree shall be entered in favor of such enemy or ally of enemy by any court except after thirty days' notice to the alien property custodian. Such notice shall be in writing and shall be served in the same manner as civil process of Federal courts.

(h) All powers of attorney heretofore or hereafter granted by an enemy or ally of enemy to any person within the United States, in so far as they may be requisite to the performance of acts authorized in subsections (a) and (g) of this section, shall be valid.

(i) Whenever the publication of an invention by the granting of a patent may, in the opinion of the President, be detrimental to the public safety or defense, or may assist the enemy or endanger the successful prosecution of the war, he may order that the invention be kept secret and withhold the grant of a patent until the end of the war: *Provided*, That the invention disclosed in the application for said patent may be held abandoned upon it being established before or by the Commissioner of Patents that, in violation of said order, said

invention has been published or that an application for a patent therefor has been filed in any other country, by the inventor or his assigns or legal representatives, without the consent or approval of the commissioner or under a license of the President.

When an applicant whose patent is withheld as herein provided and who faithfully obeys the order of the President above referred to shall tender his invention to the Government of the United States for its use, he shall, if he ultimately receives a patent, have the right to sue for compensation in the Court of Claims, such right to compensation to begin from the date of the use of the invention by the Government.

SEC. 11. Whenever during the present war the President shall find that the public safety so requires and shall make proclamation thereof it shall be unlawful to import into the United States from any country named in such proclamation any article or articles mentioned in such proclamation except at such time or times, and under such regulations or orders, and subject to such limitations and exceptions as the President shall prescribe, until otherwise ordered by the President or by Congress: *Provided, however,* That no preference shall be given to the ports of one State over those of another.

SEC. 12. That all moneys (including checks and drafts payable on demand) paid to or received by the alien property custodian pursuant to this Act shall be deposited forthwith in the Treasury of the United States, and may be invested and reinvested by the Secretary of the Treasury in United States bonds or United States certificates of indebtedness, under such rules and regulations as the President shall prescribe for such deposit, investment, and sale of securities; and as soon after the end of the war as the President shall deem practicable, such securities shall be sold and the proceeds deposited in the Treasury.

All other property of an enemy, or ally of enemy, conveyed, transferred, assigned, delivered, or paid to the alien property custodian hereunder shall be safely held and administered by him except as hereinafter provided; and the President is authorized to designate as a depositary, or depositaries, of property of an enemy or ally of enemy, any bank, or banks, or trust company, or trust companies, or other suitable depositary or depositaries, located and doing business in the United States. The alien property custodian may deposit with such designated depositary or depositaries, or with the Secretary of the Treasury, any stocks, bonds, notes, time drafts, time bills of exchange, or other securities, or property (except money or checks or drafts payable on demand which are required to be deposited with the Secretary of the Treasury) and such depositary or depositaries shall be authorized and empowered to collect any dividends or interest or income that may become due and any maturing obligations held for the account of such custodian. Any moneys collected on said account shall be paid and deposited forthwith by said depositary or by the alien property custodian into the Treasury of the United States as hereinbefore provided.

The President shall require all such designated depositaries to execute and file bonds sufficient in his judgment to protect property on deposit, such bonds to be conditioned as he may direct.

The alien property custodian shall be vested with all of the powers of a common-law trustee in respect of all property, other than money, which shall come into his possession in pursuance of the provisions of this Act, and, acting under the supervision and direction of the President, and under such rules and regulations as the President shall prescribe, may manage such property and do any act or things in respect thereof or make any disposition thereof or of any part thereof, by sale or otherwise, and exercise any rights which may be or become appurtenant thereto or to the ownership thereof, if and when necessary to prevent waste and protect such property and to the end that interests of the United States in such property and rights or of such person as may ultimately become entitled thereto, or to the proceeds thereof, may be preserved and safeguarded. It shall be the duty of every corporation incorporated within the United States and every unincorporated association, or company, or trustee, or trustees within the United States issuing shares or certificates representing beneficial interests to transfer such shares or certificates upon its, his, or their books into the name of the alien property custodian upon demand, accompanied by the presentation of the certificates which represent such shares or beneficial interests. The alien property custodian shall forthwith deposit in the Treasury of the United States, as hereinbefore provided, the proceeds of any such property or rights so sold by him.

Any money or property required or authorized by the provisions of this Act to be paid, conveyed, transferred, assigned, or delivered to the alien property custodian shall, if said custodian shall so direct by written order, be paid, conveyed, transferred, assigned, or delivered to the Treasurer of the United States with the same effect as if to the alien property custodian.

After the end of the war any claim of any enemy or of an ally of enemy to any money or other property received and held by the alien property custodian or deposited in the United States Treasury, shall be settled as Congress shall direct: *Provided, however*, That on order of the President as set forth in section nine hereof, or of the court, as set forth in sections nine and ten hereof, the alien property custodian or the Treasurer of the United States, as the case may be, shall forthwith convey, transfer, assign, and pay to the person to whom the President shall so order, or in whose behalf the court shall enter final judgment or decree, any property of an enemy or ally of enemy held by said custodian or by said Treasurer, so far as may be necessary to comply with said order of the President or said final judgment or decree of the court: *And provided further*, That the Treasurer of the United States, on order of the alien property custodian shall, as provided in section ten hereof, repay to the licensee any funds deposited by said licensee.

SEC. 13. That, during the present war, in addition to the facts required by sections forty-one hundred and ninety-seven, forty-one hundred and ninety-eight, and forty-two hundred of the Revised Statutes, as amended by the Act of June fifteenth, nineteen hundred and seventeen, to be set out in the master's and shipper's manifests before clearance will be issued to vessels bound to foreign ports, the master or person in charge of any vessel, before departure of such vessel from port, shall deliver to the collector of customs of the district wherein such vessel is located a statement duly verified by oath that the cargo is not shipped or to be delivered in violation of this Act, and the owners, shippers, or consignors of the cargo of such vessels shall in like manner deliver to the collector like statement under oath as to the cargo or the parts thereof laden or shipped by them, respectively, which statement shall contain also the names and addresses of the actual consignees of the cargo, or if the shipment is made to a bank or other broker, factor, or agent, the names and addresses of the persons who are the actual consignees on whose account the shipment is made. The master or person in control of the vessel shall, on reaching port of destination of any of the cargo, deliver a copy of the manifest and of the said master's, owner's, shipper's, or consignor's statement to the American consular officer of the district in which the cargo is unladen.

SEC. 14. That, during the present war, whenever there is reasonable cause to believe that the manifest or the additional statements under oath required by the preceding section are false or that any vessel, domestic or foreign, is about to carry out of the United States any property to or for the account or benefit of an enemy, or ally of enemy, or any property or person whose export, taking out, or transport will be in violation of law, the collector of customs for the district in which such vessel is located is hereby authorized and empowered, subject to review by the President, to refuse clearance to any such vessel, domestic or foreign, for which clearance is required by law, and by formal notice served upon the owners, master, or person or persons in command or charge of any domestic vessel for which clearance is not required by law, to forbid the departure of such vessel from the port, and it shall thereupon be unlawful for such vessel to depart.

The collector of customs shall, during the present war, in each case report to the President the amount of gold or silver coin or bullion or other moneys of the United States contained in any cargo intended for export. Such report shall include the names and addresses of the consignors and consignees, together with any facts known to the collector with reference to such shipment and particularly those which may indicate that such gold or silver coin or bullion or moneys of the United States may be intended for delivery or may be delivered, directly or indirectly, to an enemy or an ally of enemy.

SEC. 15. That the sum of \$450,000 is hereby appropriated, out of any money in the Treasury of the United States not otherwise appropriated, to be used in the discretion of the President for the purpose of carrying out the provisions of this Act during the fiscal year ending June thirtieth, nineteen hundred and eighteen, and for the payment of salaries of all persons employed under this Act, together with the necessary expenses for transportation, subsistence, rental of quarters in the District of Columbia, books of reference, periodicals, stationery, typewriters and exchanges thereof, miscellaneous supplies, printing

to be done at the Government Printing Office, and all other necessary expenses not included in the foregoing.

SEC. 16. That whoever shall willfully violate any of the provisions of this Act or of any license, rule, or regulation issued thereunder, and whoever shall willfully violate, neglect, or refuse to comply with any order of the President issued in compliance with the provisions of this Act shall, upon conviction, be fined not more than \$10,000, or, if a natural person, imprisoned for not more than ten years, or both; and the officer, director, or agent of any corporation who knowingly participates in such violation shall be punished by a like fine, imprisonment, or both, and any property, funds, securities, papers, or other articles or documents, or any vessel, together with her tackle, apparel, furniture, and equipment, concerned in such violation shall be forfeited to the United States.

SEC. 17. That the district courts of the United States are hereby given jurisdiction to make and enter all such rules as to notice and otherwise, and all such orders and decrees, and to issue such process as may be necessary and proper in the premises to enforce the provisions of this Act, with a right of appeal from the final order or decree of such court as provided in sections one hundred and twenty-eight and two hundred and thirty-eight of the Act of March third, nineteen hundred and eleven, entitled "An Act to codify, revise, and amend the laws relating to the judiciary."

SEC. 18. That the several courts of first instance in the Philippine Islands and the district court of the Canal Zone shall have jurisdiction of offenses under this Act committed within their respective districts, and concurrent jurisdiction with the district courts of the United States of offenses under this Act committed upon the high seas and of conspiracies to commit such offenses as defined by section thirty-seven of the Act entitled "An Act to codify, revise, and amend the penal laws of the United States," approved March fourth, nineteen hundred and nine, and the provisions of such section for the purpose of this Act are hereby extended to the Philippine Islands and to the Canal Zone.

SEC. 19. That ten days after the approval of this Act and until the end of the war, it shall be unlawful for any person, firm, corporation, or association, to print, publish, or circulate, or cause to be printed, published, or circulated in any foreign language, any news item, editorial or other printed matter, respecting the Government of the United States, or of any nation engaged in the present war, its policies, international relations, the state or conduct of the war, or any matter relating thereto: *Provided*, That this section shall not apply to any print, newspaper, or publication where the publisher or distributor thereof, on or before offering the same for mailing, or in any manner distributing it to the public, has filed with the postmaster at the place of publication, in the form of an affidavit, a true and complete translation of the entire article containing such matter proposed to be published in such print, newspaper, or publication, and has caused to be printed, in plain type in the English language, at the head of each such item, editorial, or other matter, on each copy of such print, newspaper, or publication, the words "True translation filed with the postmaster at _____ (naming the post office where the translation was filed, and the date of filing thereof), as required by the Act of _____ (here giving the date of this Act).

Any print, newspaper, or publication in any foreign language which does not conform to the provisions of this section is hereby declared to be nonmailable, and it shall be unlawful for any person, firm, corporation, or association, to transport, carry, or otherwise publish or distribute the same, or to transport, carry or otherwise publish or distribute any matter which is made nonmailable by the provisions of the Act relating to espionage, approved June fifteenth, nineteen hundred and seventeen: *Provided further*, That upon evidence satisfactory to him that any print, newspaper, or publication, printed in a foreign language may be printed, published, and distributed free from the foregoing restrictions and conditions without detriment to the United States in the conduct of the present war, the President may cause to be issued to the printers or publishers of such print, newspaper, or publication, a permit to print, publish, and circulate the issue or issues of their print, newspaper, or publication, free from such restrictions and requirements, such permits to be subject to revocation at his discretion. And the Postmaster General shall cause copies of all such permits and revocations of permits to be furnished to the postmaster of the post office serving the place from which the print, newspaper, or publication, granted the permit is to emanate. All matter printed, published and distributed under permits shall bear at the head thereof in plain type in the English language, the words, "Published and distributed under permit author-

ized by the Act of (here giving date of this Act), on file at the post office of (giving name of office.)"

Any person who shall make an affidavit containing any false statement in connection with the translation provided for in this section shall be guilty of the crime of perjury and subject to the punishment provided therefor by section one hundred and twenty-five of the Act of March fourth, nineteen hundred and nine, entitled "An Act to codify, revise, and amend the penal laws of the United States," and any person, firm, corporation, or association, violating any other requirement of this section shall, on conviction thereof, be punished by a fine of not more than \$500, or by imprisonment of not more than one year, or, in the discretion of the court, may be both fined and imprisoned.

Approved, October 6, 1917.

EXECUTIVE ORDER.

Relating to Conditions of Employment in the Panama Canal Service.

By virtue of the authority vested in me by law, the general conditions of employment governing employees on the Isthmus of Panama, necessary for the completion, care, management, maintenance, sanitation, government and operation of the Panama Canal, the Canal Zone, the Panama Railroad, and other adjuncts, provided by the Executive Order of February 2, 1914, are hereby amended by rescinding paragraphs numbered 22 to 41, inclusive, and substituting in lieu of such rescinded paragraphs the following:

ANNUAL LEAVE.

22. Twenty-four days annual leave will be allowed each employee for each year after entry into service, and any annual leave not used prior to the end of the service year in which it is earned shall be thereafter in the same status and subject to the same rules as cumulative leave.

23. The service year shall date from the day on which an employee's pay in the permanent organization begins.

24. Absences of one-half day or more, when regularly authorized, will be charged against annual leave; also absences on account of illness or injury, upon the certificate of an authorized physician in the service of The Panama Canal, except that in the following classes of cases no payment shall be made for time lost, but the time shall be charged against the annual leave:

(a) Illness due to the fault of the employee, as venereal disease and alcoholism.

(b) Injury due to the employee's willful intention to bring about the injury or death of himself or another.

(c) Elective surgical operations to relieve conditions existing prior to service on the Isthmus.

25. Teachers employed only during the school months, from October to June, inclusive, may be granted not to exceed twenty-four days leave within those months to cover illness or emergency, but will not be entitled to any other leave with pay and will be entitled to no leave with pay from July to September, inclusive.

26. In the cases of hourly and per diem employees annual leave on account of sickness or injury shall be based upon a day of eight hours.

27. Not more than fourteen days annual leave may be taken during the first six months of a service year. In case of illness or injury in the first six months, to cover which no annual leave remains to the employee's credit, the time lost will be charged against the annual leave remaining for the year, and payment will be made after completing ten months of the service year. After the entire twenty-four days annual leave has been used, additional leave in that service year on account of illness or injury will be deducted from the cumulative leave for that year, and when the cumulative leave becomes due the employee will be paid.

28. After exhausting both annual and cumulative leave for the year, additional absence on account of illness or injury will be without pay, except such compensation as may be prescribed by law for employees receiving personal injuries.

CUMULATIVE LEAVE.

29. Thirty days cumulative leave will be allowed each employee paid on a monthly or annual basis for each year of his service, and twenty days to each

employee paid on an hourly basis. This leave will be due after completing ten months' service each year and may be taken when the employee's service can be spared. It may be taken annually or left to accumulate to the credit of the employee, provided, however, that the maximum number of days leave with pay of all kinds which may be granted at any one time or which may be commuted into a cash payment at termination of service is 120.

30. After cumulative or annual leave is earned and due it may be taken at such times and in such numbers of days as may be satisfactory to the Governor.

31. Leave taken after the close of the service year in which it was earned shall be paid for at the rate of pay received at the end of the tenth month of the service year in which the leave was earned. When an employee enters on a leave of absence which consists of or includes annual leave earned in the same year in which he enters on the leave, such annual leave shall be paid for at the rate received by the employee when he entered on the leave.

32. In case an employee serves part of a year on the monthly or annual basis and part on the hourly basis, he will be allowed twenty days cumulative leave, except that if he has served eight months or more on the monthly or annual basis during the year he will be granted thirty days cumulative leave.

TRAVEL LEAVE.

33. Employees who travel to points outside the tropics, when on cumulative leave, will be allowed seven days additional leave (or travel leave) with full pay, provided the total of all leave with pay granted shall not exceed 120 days. Travel leave may be allowed approximately once a year and is not cumulative.

34. Employees will be compensated for travel leave at the rate earned when cumulative leave last became due.

GENERAL PROVISIONS.

35. After accumulating leave of all kinds amounting to 120 days, an employee ceases to earn additional cumulative leave until he is granted all or part of the cumulative leave already earned, unless he shall enter on cumulative leave within two months thereafter, or be ordered by the Governor to defer taking leave for official reasons.

36. When an employee's service is terminated, a cash payment in commutation of leave will be made to him for the number of days cumulative leave due plus the annual leave due. In the event of his death his estate will be paid the sum due.

37. Employees must report from leave within one week after the authorized leave expires or forfeit pay for the leave. In case of unavoidable delay, the Governor will decide whether the circumstances warrant an exception to this rule.

38. No restrictions are placed on the localities where leave may be spent.

39. Any employee transferred from the present force to the permanent operating force will be paid at the time of transfer, in addition to his regular compensation, the amount he would have received in payment for leave had he been separated from the service at the time of transfer.

40. Leave may be taken only at the convenience of heads of departments, who may direct an employee to accumulate his leave if necessary for the conduct of the work.

41. Leave without pay may be granted by the Governor to all employees, including laborers, for such period as may be prescribed by him.

OFFICE HOURS AND HOURS OF LABOR.

42. Office hours and hours of labor will be fixed by the Governor within the limits prescribed by law.

This order shall take effect on and after the 31st day of December, 1916, and shall apply to all classes of leave with pay earned and due as of that date and thereafter.

WOODROW WILSON.

THE WHITE HOUSE, 15 January, 1917.

EXECUTIVE ORDER.

By virtue of the authority vested in me by the provisions of the Act of Congress approved August 21, 1916, entitled "An Act extending certain privileges of Canal employees to other officials on the Canal Zone, and authorizing the President to make rules and regulations affecting the health, sanitation, quarantine, taxation, public roads, self-propelled vehicles and police powers on the Canal Zone, and for other purposes, including provision as to certain fees, money orders and interest deposits," I do hereby establish the following Executive Order for the Canal Zone:

SEC. 1. The Governor of The Panama Canal is hereby empowered to exclude or to cause to be excluded the following classes of persons from the Canal Zone: Idiots, imbeciles, feeble-minded persons, the insane, persons who have been insane within five years previous to their attempted entry into the Canal Zone, epileptics, paupers, criminals, professional beggars, gypsies, persons of notoriously bad character, persons whose presence would be a menace to the public health or welfare of the Canal Zone, or who would be liable to become a public charge, or who may be suffering from a loathsome or dangerous contagious disease, those who have been convicted of felony, anarchists, those whose purpose it is to incite insurrection, and others whose presence, in the judgment of the Governor, would tend to create public disorder or in any manner impede the prosecution of the work of opening the Canal or its maintenance, operation, sanitation, and protection; and the Governor may expel from the Canal Zone, and deport therefrom, any person convicted of a criminal offense of the grade of felony, or whose presence, in the judgment of the Governor, would tend to create public disorder or in any manner impede the prosecution of the work of opening the Canal or its maintenance, operation, sanitation, or protection.

The cost of excluding or deporting persons hereunder shall be a charge against the person or interest responsible for the entry of the undesirable person into the Canal Zone, the collection thereof to be enforced in the manner hereinafter provided. In cases of deportation in which no person or interest can be held responsible for the cost hereunder, the cost of such deportation shall be paid from the appropriations made for the maintenance, operation, sanitation and protection of the Canal.

SEC. 2. Any person falling within any one of the excluded classes mentioned in the foregoing section, who desires to cross the Canal Zone in order to reach his final destination, may be allowed to effect such transit in the custody of a representative of the Panama Canal authorities, provided the owner, or master of, or person, or interest controlling the vessel, upon which such person arrives at a port in the Canal Zone will agree, in writing, that if such person is rejected at his final destination and returned to the Canal Zone, his deportation therefrom shall be at the expense of the owner or interest controlling the vessel, in which case the cost of the deportation shall be enforced against the owner or interest in the manner prescribed by the law of Congress and the provisions of this Executive Order.

SEC. 3. The owner or interest controlling a vessel bringing a person to the Canal Zone, who is subject to exclusion under this order, shall carry such excluded person to his port of embarkation, when required to do so by the Panama Canal authorities, and, when so required by the Canal authorities, return a certificate to said authorities, from the proper officials of the port of embarkation, stating that said excluded person had been landed at said port.

SEC. 4. No member of a crew of any vessel shall be paid off and discharged at any port of the Canal Zone without the consent of the Panama Canal authorities, unless it be shown by the ship's articles that said member of the crew signed said articles at a port in the Canal Zone.

SEC. 5. It shall be the duty of the owners, officers and agents of any vessel bringing persons excluded hereunder to the Canal Zone to adopt due precaution to prevent the landing of any such persons at any time or place other than that designated by the proper officials of The Panama Canal, and any such owner, officer, agent or person in charge of such vessel, who shall land or permit to land, any such excluded person at any time or place other than that designated by the authorities of The Panama Canal, shall be punished as hereinafter provided.

SEC. 6. The master or person in charge of a vessel bringing any person subject to exclusion hereunder to the Canal Zone shall be required to receive such person on board, when his or her deportation has been ordered, at any time previous to the advertised date of sailing of the said vessel, and if the master

is absent at the time the said person is delivered on board, the officer or person in charge of the vessel shall receive such excluded person.

SEC. 7. Any excluded person awaiting deportation, or any person held for the determination of his right of entry into the Canal Zone, may be detained at the Canal Zone police station or other place designated by the detaining officer, when such action is deemed necessary by such officer.

SEC. 8. All expense incident to the detention, maintenance, transportation (including transportation of baggage) of any excluded person, or of any person held for the determination of his right of entry into the Canal Zone, as well as the cost of deportation of such excluded person, shall be charged to the owner of the vessel bringing such excluded person to the Canal Zone, or to the interest controlling such vessel, except where otherwise expressly provided by law.

SEC. 9. Clearances may be withheld from vessels until all expenses authorized by this order against the owner of or interest controlling such vessels have been duly paid to the Panama Canal authorities.

SEC. 10. Quarantine officers are hereby authorized to administer oaths, and for that purpose they shall have the powers of a notary public.

SEC. 11. The Governor of The Panama Canal is hereby authorized to make rules and regulations to carry out the foregoing provisions of this order, not inconsistent with its terms.

SEC. 12. The penalty for each violation of any of the foregoing provisions of this order shall be a fine not to exceed \$500.00 or imprisonment not to exceed one year, or both such fine and imprisonment, at the discretion of the court, in conformity with the above-mentioned Act of Congress approved August 21, 1916.

SEC. 13. The quarantine rules and regulations for the Canal Zone and the harbors of the cities of Panama and Colon, Republic of Panama, contained in the President's Executive Order dated April 15, 1913, (No. 1761) as amended by the Executive Orders dated August 14, 1914, (No. 2020) and January 11, 1915, (No. 2118), are hereby re-enacted, and shall become effective on and after the date of this Executive Order, and any violation of said quarantine rules and regulations shall be punished by a fine not to exceed \$500.00 or by imprisonment in jail not to exceed ninety days, or by both such fine and imprisonment in the court's discretion, in conformity with the above mentioned Act of Congress of August 21, 1916.

SEC. 14. All laws and orders in conflict with this order are hereby repealed.

SEC. 15. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, 6 February, 1917.

[No. 2527.]

EXECUTIVE ORDER.

Relating to the exclusion of Chinese.

By virtue of the authority vested in me by the provisions of the Act of Congress approved August 21, 1916, entitled "An Act extending certain privileges of Canal employees to other officials on the Canal Zone, and authorizing the President to make rules and regulations affecting the health, sanitation, quarantine, taxation, public roads, self-propelled vehicles and police powers on the Canal Zone, and for other purposes, including provision as to certain fees, money orders and interest deposits," I do hereby establish the following Executive Order for the Canal Zone:

SEC. 1. The Executive Order of January 9, 1908, extending to the Canal Zone Law No. 6 of 1904, of the Republic of Panama, is hereby repealed.

SEC. 2. No Chinese person shall be allowed to enter into or remain in the Canal Zone, except as provided in this order; and any Chinese person found in the Canal Zone in contravention of the provisions of this order shall be punished as hereinafter prescribed.

Any Chinese person who shall come into the Canal Zone, with the intention of passing into the Republic of Panama, in contravention of the laws of the Republic of Panama, shall be deemed guilty of a violation of this section.

SEC. 3. The master of any vessel, who shall knowingly bring into the Canal Zone on such vessel and land, or attempt to land, or permit to be landed, any

Chinese person, except as provided for in this order, shall be punished in the manner hereinafter prescribed, for each Chinese person so brought into and landed in the Canal Zone, or attempted or permitted to be landed therein; provided, however, that when a vessel, having Chinese persons on board, comes within the Canal Zone in distress, or under stress of weather, or when a vessel, having Chinese persons on board, touches at a port of the Canal Zone on its voyage to any foreign port or place, such Chinese persons may be permitted to land when authorized by the Governor of The Panama Canal, but they must depart from the Canal Zone with the vessel on its leaving the port.

Every person who aids or abets in the violation of this order shall be deemed equally guilty with the master of the vessel.

SEC. 4. The master of any vessel from a foreign port, with one or more Chinese persons on board, stopping at a port in the Canal Zone, in addition to the other matters required to be reported by him, shall deliver to the customs official of such Canal port, when he delivers his manifest of cargo, or if there be no cargo when he makes legal entry of his vessel, a descriptive list of all Chinese persons on board of his vessel at the time of its arrival in the Canal Zone. Such list shall contain the names of such Chinese persons, and other particulars regarding them, shown by the ship's papers, and shall be sworn to and subscribed by the master before the customs official to whom the list is delivered; and the customs official is hereby authorized to administer the oath to the master, provided, that when a vessel passes through the Canal, without discharging or taking on cargo or passengers therein, the master of such vessel shall not be required to furnish the list of persons prescribed by this section. If the master of the vessel refuses to deliver the list as required by this section, or fails or refuses to take and subscribe the oath prescribed herein; or if the master of such vessel permits any Chinese person on board the ship to land in the Canal Zone except by authority of the Governor of The Panama Canal, he shall be deemed guilty of a violation of this section.

SEC. 5. Chinese persons, arriving from foreign ports, who desire to enter the Canal Zone in transit to other countries, may be permitted to do so upon such conditions as the Governor of The Panama Canal may prescribe by general or special authorization.

Should the destination of such transients be a place in the Republic of Panama, they shall not be permitted to land in the Canal Zone unless the consent of the authorities of Panama is obtained for their entry into the Republic.

SEC. 6. No Chinese member of the crew of any vessel shall be paid off and discharged within a port of the Canal Zone, without the consent of the Panama Canal authorities, unless it be shown by the ship's articles that said Chinese member of the crew signed said articles at a port in the Canal Zone; and seamen or other members of a ship's crew of the Chinese race, when discharged at any port in the Canal Zone under authority of the Governor, may land and remain temporarily therein until a re-shipment is obtained by them, provided a bond in the sum of \$500.00 in each case, is executed by such Chinese person, satisfactory to the shipping commissioner, and payable to the Governor of The Panama Canal, and his successors in office, and conditioned that the principal in the bond, in good faith, will obtain a re-shipment and leave the Canal Zone at the earliest date practicable, to be fixed by the shipping commissioner; and said bond may be forfeited, for the full amount thereof, in favor of The Panama Canal, by judgment in the district court of the Canal Zone, should the principal in said bond fail to comply with any of the conditions thereof.

SEC. 7. This order shall not apply to diplomatic and consular agents of the Chinese government, who shall be entitled to be admitted into the Canal Zone upon proof of their official character; neither shall it apply to Chinese persons lawfully residing in the Canal Zone at the time of the promulgation of this order, but this shall not prevent their removal from the Canal Zone in accordance with the depopulation or deportation laws; neither shall this order apply to a Chinese person who is lawfully residing in the Republic of Panama at the time of the promulgation of this order, and such person shall be authorized to enter into and cross the Canal Zone in a like manner as is permitted to the residents of the Republic of Panama; neither shall this order apply to Chinese persons whose services have been contracted for by the United States, The Panama Canal, or Panama Railroad Company, or any of the auxiliaries of the Canal or the Railroad Company; nor to domestic servants and others employed by persons engaged in the service of the Army or Navy of the United States, stationed in the Canal Zone, when such employment is with the sanction of the respective commanding

officers of such forces on the Isthmus; nor shall it apply to any Chinese person coming into the Canal Zone by authority of the Governor of The Panama Canal.

SEC. 8. The Governor of The Panama Canal is hereby authorized to establish rules and regulations to more effectively carry out this order.

SEC. 9. A violation of any of the provisions of this order shall be punished by a fine not to exceed \$500.00 or imprisonment not to exceed one year, or both such fine and imprisonment, at the discretion of the court, in conformity with the above mentioned Act of Congress approved August 21, 1916.

SEC. 10. This order shall take effect sixty (60) days from and after its publication in the Panama Canal Record.

WOODROW WILSON.

THE WHITE HOUSE, 6 February, 1917.

[No. 2526.]

EXECUTIVE ORDER.

Fixing the compensation of Joint Commission Umpire.

By direction of the President it is ordered that Senor Don Manuel Walls y Merino, who has been appointed umpire in virtue of the provisions of Articles VI and XV of the Treaty of November 18, 1903, between the United States and the Republic of Panama in the settlement of certain claims which have come before the Joint Commission provided for in those articles, and in which the Commission has failed to render a decision owing to disagreement, be allowed Ten Thousand Dollars (\$10,000), per annum for his services, effective the day he sails from New York, N. Y., for the Isthmus of Panama and terminating upon the day of his return to New York, N. Y. In addition, he shall be allowed his actual and necessary traveling expenses from Washington, D. C., to the Isthmus of Panama and return to Washington; provided that should he elect not to return to Washington, D. C., he shall be paid his salary for a period equal to that for which he would have been paid, and he shall be paid in addition a sum equal to that which he would have expended for steamship, railroad and Pullman transportation had he returned to Washington, D. C., by direct route. He shall be allowed free transportation of his personal effects and household goods on the Panama Railroad and on the steamers of the Panama Railroad Steamship Line; he shall be allowed free transportation over the Panama Railroad, and such other transportation as may be necessary when traveling on official business on the Isthmus including employes' rates at the hotels of The Panama Canal or the Panama Railroad Company on the Isthmus.

NEWTON D. BAKER,
Secretary of War.

WAR DEPARTMENT, Washington, D. C., March 20, 1917.

EXECUTIVE ORDER.

Control of Canal and Canal Zone during hostilities.

By virtue of the power and authority vested in and conferred upon me by Section 13 of the Panama Canal Act approved August 24, 1912 (37 Statutes at Large, 560, 569), it is hereby ordered that the Officer of the Army commanding the United States Troops stationed in the Canal Zone and his successors in command shall, from the date hereof and during the continuance of the present war between the United States and Germany or until otherwise ordered, assume and have exclusive authority and jurisdiction over the operation of the Panama Canal and all its adjuncts, appendants, and appurtenances, including the entire control and government of the Canal Zone, and, while this order is in force, the Governor of the Panama Canal shall, in all respects and particulars as to the operation of the Panama Canal, and all duties, matters and transactions affecting the Canal Zone, be subject to the orders and direction of the Officer of the Army hereby designated.

WOODROW WILSON.

THE WHITE HOUSE, April 9, 1917.

[Rules and regulations for the regulation, management, and protection of the Panama Canal and the maintenance of its neutrality.]

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A PROCLAMATION.

Whereas the United States exercises sovereignty in the land and waters of the Canal Zone and is responsible for the construction, operation, maintenance, and protection of the Panama Canal:

Now, therefore, I, Woodrow Wilson, President of the United States of America, do hereby declare and proclaim the following Rules and Regulations for the regulation, management and protection of the Panama Canal and the Maintenance of its Neutrality which are in addition to the general "Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, including all Waters under its jurisdiction" put into force by Executive Order of July 9, 1914.

Rule 1. A vessel of war, for the purposes of these rules, is defined as a public armed vessel, under the command of an officer duly commissioned by the government, whose name appears on the list of officers of the military fleet, and the crew of which are under regular naval discipline, which vessel is qualified by its armament and the character of its personnel to take offensive action against the public or private ships of the enemy.

Rule 2. An auxiliary vessel, for the purposes of these rules, is defined as any vessel, belligerent or neutral, armed or unarmed, which does not fall under the definition of Rule 1, which is employed as a transport or fleet auxiliary or in any other way for the direct purpose of prosecuting or aiding hostilities, whether by land or sea; but a vessel fitted up and used exclusively as a hospital ship is excepted.

Rule 3. A vessel of war or an auxiliary vessel of a belligerent, other than the United States, shall only be permitted to pass through the Canal after her commanding officer has given written assurance to the Authorities of the Panama Canal that the Rules and Regulations will be faithfully observed.

The authorities of the Panama Canal shall take such steps as may be requisite to insure the observance of the Rules and Regulations by auxiliary vessels which are not commanded by an officer of the military fleet.

Rule 4. Vessels of war or auxiliary vessels of a belligerent, other than the United States, shall not revictual nor take any stores in the Canal except so far as may be strictly necessary; and the transit of such vessels through the Canal shall be effected with the least possible delay in accordance with the Canal Regulations in force, and with only such intermission as may result from the necessities of the service.

Prizes shall be in all respects subject to the same Rules as vessels of war of a belligerent.

Rule 5. No vessel of war or auxiliary vessel of a belligerent, other than the United States, shall receive fuel or lubricants while within the territorial waters of the Canal Zone, except on the written authorization of the Canal Authorities, specifying the amount of fuel and lubricants which may be received.

Rule 6. Before issuing any authorization for the receipt of fuel and lubricants by any vessel of war or auxiliary vessel of a belligerent, other than the United States, the Canal Authorities shall obtain a written declaration, duly signed by the officer commanding such vessel, stating the amount of fuel and lubricants already on board.

Rule 7. Fuel and lubricants may be taken on board vessels of war or auxiliary vessels of a belligerent, other than the United States, only upon permission of the Canal Authorities, and then only in such amounts as will enable them, with the fuel and lubricants already on board, to reach the nearest accessible port, not an enemy port, at which they can obtain supplies necessary for the continuation of the voyage. Provisions furnished by contractors may be supplied only upon permission of the Canal Authorities, and then only in amount sufficient to bring up their supplies to the peace standard.

Rule 8. No belligerent, other than the United States, shall embark or disembark troops, munitions of war, or warlike materials in the Canal, except in case of necessity due to accidental hindrance of the transit. In such cases the Canal Authorities shall be the judge of the necessity, and the transit shall be resumed with all possible dispatch.

Rule 9. Vessels of war or auxiliary vessels of a belligerent, other than the United States, shall not remain in the territorial waters of the Canal Zone under the jurisdiction of the United States longer than twenty-four hours at any one time, except in case of distress; and in such case, shall depart as soon as possible.

Rule 10. In the exercise of the exclusive right of the United States to provide for the regulation and management of the Canal, and in order to ensure that the Canal shall be kept free and open on terms of entire equality to vessels of commerce and of war, there shall not be, except by special arrangement, at any one time a greater number of vessels of war of any one nation, other than the United States, including those of the allies of such nation, than three in either terminal port and its adjacent terminal waters, or than three in transit through the Canal; nor shall the total number of such vessels, at any one time, exceed six in all the territorial waters of the Canal Zone under the jurisdiction of the United States.

Rule 11. The repair facilities and docks belonging to the United States and administered by the Canal Authorities shall not be used by a vessel of war or an auxiliary vessel of a belligerent, other than the United States, except when necessary in case of actual distress, and then only upon the order of the Canal Authorities, and only to the degree necessary to render the vessel seaworthy. Any work authorized shall be done with the least possible delay.

Rule 12. The radio installation of any public or private vessel or of any auxiliary vessel of a belligerent, other than the United States, shall be used only in connection with Canal business to the exclusion of all other business while within the waters of the Canal Zone, including the waters of Colon and Panama Harbors.

Rule 13. Aircraft, public or private, of a belligerent, other than the United States, are forbidden to descend or arise within the jurisdiction of the United States at the Canal Zone, or to pass through the air spaces above the lands and waters within said jurisdiction.

Rule 14. For the purpose of these rules the Canal Zone includes the cities of Panama and Colon and the harbors adjacent to the said cities.

Rule 15. In the interest of the protection of the Canal while the United States is a belligerent no vessel of war, auxiliary vessel, or private vessel of an enemy of the United States or an ally of such enemy shall be allowed to use the Panama Canal nor the territorial waters of the Canal Zone for any purpose, save with the consent of the Canal Authorities and subject to such rules and regulations as they may prescribe.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington this twenty-third day of May in the year of our Lord one thousand nine hundred and seventeen, and of the Independence of the United States of America the one hundred and forty-first.

[SEAL.]

WOODROW WILSON.

By the President:

ROBERT LANSING,
Secretary of State.

[No. 1371.]

EXECUTIVE ORDER.

Establishing defensive sea areas for terminal ports of The Panama Canal, and providing regulations for the government of persons and vessels within said areas.

By virtue of the authority vested in me by law, the following-described defensive sea areas for the terminal ports of The Panama Canal are hereby established, to be maintained until further notification, at the places and within the limits prescribed as follows, that is to say:

Atlantic entrance.—Outer limit: From the northern end of Naranjos Cays to a point 2 miles due north of the breakwater entrance, thence tangent to the arc of a circle with 1-mile radius, having the mouth of the Chagres River as a center, thence along the arc of this circle to the beach.

Inner limit: Line joining east end of west breakwater and west end of east breakwater.

Pacific entrance.—Outer limit: Line joining Venado Island with north end of Taboguilla Island; thence north 53° east, true, for 5 miles; thence north

39° west to a point with San Jose Rock bearing north ¹ 53° west, true, distant 2 nautical miles; thence to Tres Hermanos Beacon; thence to Punta Mala.

Inner limit: Line joining Guinea Point with inner end of causeway.

The following orders and regulations for the government of persons and vessels within the limits of said defensive sea areas, which orders and regulations are necessary for the purposes of defense of the Canal Zone, are hereby promulgated:

I. In the neighborhood of each defensive sea area the following entrances are designated for incoming and outgoing vessels:

Atlantic.—Designated entrance for incoming vessels: A patrol boat stationed with end of west breakwater bearing south, true, distant 2 nautical miles.

Designated entrance for outgoing vessels: The main entrance to the Panama Canal, between the breakwaters.

Pacific.—Designated entrance for incoming vessels: Patrol boat stationed with north end of Taboguilla Island bearing due west, distant 1 nautical mile.

Designated entrance for outgoing vessels: Canal prism.

II. A vessel desiring to cross a defensive sea area shall proceed to the vicinity of the entrance, flying her national colors, together with International Code number and pilot signal, and there await communication with the Harbor Entrance Patrol. It is expressly prohibited for any vessel to enter the limits of a defensive sea area otherwise than at a designated entrance and after authorization by the Harbor Entrance Patrol.

III. Boats and other craft employed in the Harbor Entrance Patrol will be distinguished by the union jack, which will be shown from a position forward. At night they may show a vertical hoist of 3 lights—white, red, and white, in the order named.

IV. On receiving permission from the Harbor Entrance Patrol to enter a defensive sea area, a vessel must comply with all instructions as to pilotage and other matters that she may receive from proper authority, either before or during her passage across the area; it is understood that only upon condition of such compliance is the said permission granted.

V. No permission will be granted to other than a public vessel of the United States or a Canal craft to cross a defensive sea area between sunset and sunrise, nor during the prevalence of weather conditions that render navigation difficult or dangerous. A vessel arriving off a defensive sea area after sunset shall anchor or lie-to at a distance of at least a mile outside its limits until the following sunrise; vessels discovered near the limits of the areas at night may be fired upon.

VI. No vessel shall be permitted to proceed within the limits of a defensive sea area at a greater speed than six (6) knots per hour.

VII. All matters pertaining to fishery and the passage of small crafts within a defensive sea area shall be regulated by the senior officer of the Harbor Entrance Patrol.

VIII. These regulations are subject to modification by the senior officer of the Harbor Entrance Patrol when the public interest may require; and such notification as circumstances may permit will be issued regarding modifications thus made.

IX. Any master of a vessel or other person within the vicinity of a defensive sea area who shall violate these regulations, or shall fail to obey the order to stop and heave to, or shall perform any act threatening the efficiency of mine or other defenses or the safety of navigation, or shall take any action inimical to the interests of the United States in its prosecution of war, may be detained therein by force of arms and renders himself liable to prosecution.

X. The responsibility of the United States of America for any damage inflicted by force of arms with the object of detaining any person or vessel proceeding in contravention to regulations duly promulgated in accordance with this executive order shall cease from this date.

XI. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, 27 August, 1917.

[No. 2692.]

¹ Subsequently corrected to read "south." See page 414.

EXECUTIVE ORDER.

By direction of the President, it is ordered—

That Burt New and George A. Connolly, who have been appointed members of the Joint Commission for the appraisalment and settlement of damages to property in the Canal Zone, in accordance with the provisions of Articles Six and Fifteen of the Convention between the United States and Panama, concluded November 18, 1903, be allowed Twenty-five (\$25) dollars per day for their services, including all expenses, from the time of their sailing from New York until their return thither; provided, that they shall be granted free transportation on the Panama Railroad Steamship Line from New York to the Isthmus and return, free transportation over the Panama Railroad, and such other transportation as may be necessary when traveling on official business on the Isthmus; they shall also be allowed the ordinary privileges of Government employees on the Isthmus, including employees' rates at the hotels of the Panama Canal or the Panama Railroad Company on the Isthmus.

NEWTON D. BAKER,

Secretary of War.

WAR DEPARTMENT, *Washington, D. C., September 14, 1917.*

EXECUTIVE ORDER.

CORRECTION OF EXECUTIVE ORDER NUMBER 2692, DATED AUGUST 27, 1917, ENTITLED "ESTABLISHING DEFENSIVE SEA AREAS FOR TERMINAL PORTS OF THE PANAMA CANAL, AND PROVIDING REGULATIONS FOR THE GOVERNMENT OF PERSONS AND VESSELS WITHIN SAID AREAS."

In order to correct a typographical error in the Executive Order dated August 27, 1917, entitled "Establishing Defensive Sea Areas for Terminal Ports of The Panama Canal, and Providing Regulations for the Government of Persons and Vessels Within Said Areas," it is hereby directed that the word "south" be substituted for the word "north" following the words "thence north 39° west to a point with San José Rock bearing" in the description of the outer limit of the Pacific entrance of the defensive sea areas of the terminal ports of The Panama Canal. As corrected, the description will read as follows: "PACIFIC ENTRANCE:

"OUTER LIMIT.—Line joining Venado Island with north end of Taboguilla Island; thence north 53° east, true, for 5 miles; thence north 39° west to a point with San José Rock bearing south 53° west, true, distant 2 nautical miles; thence to Tres Hermanos Beacon; thence to Punta Mala."

WOODROW WILSON

THE WHITE HOUSE,

24 October, 1917.

[No. 2737.]

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